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MOLLUSCA OF THE YELLOWSTONE PARK, TETON PARK AND JACKSON HOLE REGION

BY JUNIUS HENDERSON

Notwithstanding the great area covered by Yellowstone National Park, Teton National Park and Jackson Hole, Wyoming, and the fact that each year for many years past the region has been visited by thousands of people, including many naturalists, surprisingly little has been published about the mollusks of the region. My notes mention only the following published records: Jackson Lake is the type locality of *Pomatiopsis robusta* Walker, 1908, *Lymnaea jacksonensis* F. C. Baker, 1907, and *Carinifex jacksonensis* Henderson, 1932. *Lymnaea caperata warthini* Baker, 1923, was described from hot springs just below the Upper Yellowstone Falls, and has been reported nowhere else. The type locality of *Oreohelix cooperi maxima* Pilsbry, 1916, is the northern part of Yellowstone Park, ten miles southwest of Jardine, Montana, though it was also reported from Grade Canyon, near Cokeville, Wyoming. Brues, in his paper on the mollusks of hot springs (Proc. Natl. Acad. of Science and Arts, LIX, 416-418, 1924), reported an imperfect shell of *Amnicola* sp. in a caddis case from a hot, sulphurous pool near Junction Butte; *Physa heterostropha* (dwarf form same as described by Lea as *P. aurea* from a hot spring at Bath, Virginia) in water of a temperature of 96° Fahr., heavily charged with silica, at the outlet of Firehole Lake; and *Lymnaea palustris* Müll. from a spring with a temperature of 80° to 96° Fahr., near Mary's Bay, on the north shore of Yellowstone Lake; all in Yellowstone Park. His *Physa* was almost certainly incorrectly determined. To check the

identification we visited the locality in 1932, but failed to find any mollusks there for determination. His *Lymnaea* was probably the subspecies *nuttalliana*, as that is the common form in the Yellowstone drainage and the only one likely to be identified as *palustris*, except possibly *wyomingensis*. Stearns, 1893, reported that *Lymnaea bulimoides* Lea was found in Yellowstone Park by the Hayden Survey. This may be doubted. In my report on the mollusks of Colorado, Utah, Montana, Idaho and Wyoming, 1924, I reported *Physa blandi* Lea (as identified by Bryant Walker) and *Lymnaea palustris haydeni* Lea (as identified by Baker), from the Madison River, a few miles within the western edge of Yellowstone Park. The latter should be referred to *L. binneyi* Tryon, as is true also of material from several Idaho localities which was recorded as *haydeni*, with which view Mr. Baker now agrees. The true *haydeni* seems to be an exact synonym or scarcely distinguishable form of *nuttalliana*, which is common throughout Montana. In the same publication I reported also *Vallonia cyclophorella* Ancey, *Zonitoides arboreus* Say and *Gonyodiscus cronkhitei anthonyi* (Pilsbry), all from seven miles north of Moran, east of Jackson Lake, Wyoming.

Since 1924, with various assistants, I have made several hasty trips through the region. As a result I can now report the following: Slough on Yellowstone River about six miles south of Canyon Junction, *Lymnaea palustris nuttalliana* Lea (not typical, according to Baker). Swamp near Gardiner River, east of Mammoth Hot Springs, *Pisidium concinnulum* Sterki (identified by Sterki), *Aplexa hypnorum* (L.), *Lymnaea palustris nuttalliana* Lea (not typical), *Agriolimax agrestis* (W. G. Binney) and *Gonyodiscus cronkhitei anthonyi* (Pilsbry). Aspen grove a mile or so northwest of Mammoth Hotel, *Euconulus fulvus alaskensis* (Pilsbry), *Gonyodiscus cronkhitei cronkhitei* (Newcomb), *Pupilla muscorum* L., *Vallonia cyclophorella* Ancey, *Vertigo* sp., *Vitrina alaskana* Dall, *Zonitoides arboreus* Say and the Rocky Mountain species which has been generally known as *Oreohelix cooperi* (W. G. Binney), but which has been found to be

distinct from the true *cooperi* of the Black Hills, South Dakota, and is called *Oreohelix subrudis* (Pfr.) by Dr. Pilsbry. This *Oreohelix* occurs also in abundance under the heavy leaves of *Balsamorrhiza* and other plants, along the south margin of Jupiter Terrace and along the mountain slope west of the terraces from south of Orange Spring to and up Clematis Gulch, west of Mammoth Hotel, and thence northward. At one place in Clematis Gulch it occurs associated with *Oreohelix berryi* Pilsbry but perfectly distinct therefrom, the two showing no tendency toward cross-breeding or intergrading. We have received from Professor Vasco M. Tanner several small specimens which seem referable to *Lymnaea stagnalis jugularis* Say, obtained in Swan Lake, Yellowstone Park.

North of Yellowstone Park, *Lymnaea binneyi* occurs in Yellowstone River, four miles south of Livingston. We found *Lymnaea caperata* Say in a slough three miles south of Livingston and another 22 miles south, along the Yellowstone River, so it may be expected in the Park.

South of the Park, in Jackson Lake at Moran, in addition to the three species originally described from there, as hereinbefore indicated, we found a single specimen of *Valvata humeralis californica* Pilsbry. Several miles north of Moran we found *Physa traskii* Lea (as identified by Bryant Walker) and *Gyraulus vermicularis* (Gould). In a slough just north of Jackson we obtained *Aplexa hypnorum* (L.) and *Lymnaea palustris wyomingensis* Baker. On the mountain slope above this slough *Oreohelix depressa* (Cockerell) was found in quantity by Mr. Hugo G. Rodeck, assistant curator of the University of Colorado Museum. At Jenny Lake, in Teton National Park, Mrs. Henderson and I found *Lymnaea* related to *L. montana* Elrod, and large, undetermined *Physa*.

A display collection of the shells of the region has been prepared at the University of Colorado Museum and donated to the Museum at Mammoth, Yellowstone Park.

POLYGYRA DORFEUILLIANA AND BULIMULUS DEALBATUS IN ILLINOIS*

BY FRANK C. BAKER

Several years ago Dr. George E. Ekblaw, Geologist of the Illinois State Geological Survey, collected a number of mollusks on Fountain Bluff, Jackson County, Illinois. Among these were bleached shells of two species not before reported from Illinois territory, *Polygyra dorfeuilliana* (Lea) and *Bulimulus dealbatus* (Say). As the condition of the specimens received was similar to that of many Pleistocene fossils it was thought that these hitherto exotic species to the state might be evidences of a former geographic extension northward and eastward. Fountain Bluff was visited during the 1931 field work but no specimens of these species were found. In 1932 special search was carried on at Fountain Bluff, with the result that the two species were found in one location, the same as that visited by Dr. Ekblaw, but in no other place on this bluff. *Polygyra dorfeuilliana*, however, was found in abundance on other bluffs bordering the Mississippi River. The occurrence of these two species so far from their recorded limits is deemed of enough importance to warrant special consideration.

Bulimulus dealbatus (Say). The specimens from Fountain Bluff, Union County, belong to the typical form and are not the form called *ozarkensis* by Pilsbry. Sampson, in his Mollusca of Missouri (Trans. Acad. Sci. St. Louis, XXII, p. 100, 1913) refers all Bulimuli in Missouri to the race *ozarkensis*, giving the most northern and eastern locality as Hannibal, Marion County, near the Mississippi River. This locality is opposite Adams County, Illinois, but no Bulimuli have been found in this region of the state. The nearest Missouri record observed for Bulimulus is Rivermines, St. Francois Co., about sixty miles west of the Fountain Bluff locality. It is probable that not one of the Bulimulus in Missouri belong to the race *ozarkensis*, which Pilsbry restricts to the

* Contribution from the Museum of Natural History, University of Illinois, No. 70, and the Illinois Natural History Survey in co-operation.

northern and western outliers of the Ozark system, including southwestern Missouri. The Fountain Bluff *dealbatus* without doubt crossed the Mississippi River from Missouri, and the species will probably be found on the Missouri side of the Mississippi River. The Illinois specimens are like Pilsbry's figure 13, plate VI, in Proc. Acad. Nat. Phil., 1906, and described on page 136 of that paper. The typical form has been collected in Kentucky, Tennessee, Alabama, and west to Kansas (Shawnee County). It is not known from Indiana and appears to reach its most northern distribution in Missouri. Although special search was made for this species in southern Illinois, in the eastern extension of the Ozarkian uplift, not a vestige of it could be found.

Fountain Bluff is an isolated outlier of erosion, four miles west of the main bluff escarpment in Illinois and separated from the Bluffs in Missouri by a mile of Mississippi River flood plain, including this stream which is here a quarter to half a mile wide. The bluff is four miles long and three-quarters of a mile wide. Its greatest elevation is about 680 feet or 320 feet above the river. The Bulimulus were found only on a topographic node east of the power station at a height of about 620 feet. (See the Alto Pass and Altenberg topographic sheets of the U. S. Geol. Surv.) While all of the specimens collected were without the animal, many of them retained the original color markings indicating that the owner was in possession quite recently.

Polygyra dorfeuilliana (Lea). The presence of this species in Illinois is quite surprising. The specimens are typical and like the type of Lea, supposed to come from some Kentucky locality. They are also like a specimen in the Philadelphia Academy supposed to have been received from Dorfeuille, the original collector (according to Pilsbry). The typical form has a lip-callus ending in front of the upper tooth, and this feature is well shown in the Illinois specimens, but is rare in the shells from more western localities. The distribution of *dorfeuilliana* is well shown by Pilsbry (Proc. Phil. Acad., 1906, p. 536) who indicates a wide range in Missouri and Arkansas, the nearest states to Illinois. The

Missouri locality nearest to the Illinois localities is Fern Glen, St. Louis Co. (Sampson, Trans. Acad. Sci. St. Louis, XXII, p. 99, 1913), which is only some 25 miles north of the Illinois localities and not far from the Mississippi River. In Illinois, *dorfeuilliana* was found abundantly in the area south of East St. Louis in Monroe County, from Valmeyer south to Prairie du Rocher, in Randolph County, a distance of some twenty miles. It was not found in the hills at Chester, Randolph County, and does not again appear until the Fountain Bluff region is reached, about forty miles southward. Of course, there may be isolated colonies between these points which were not found by the Illinois survey party.

The local distribution of the colonies is noteworthy. The species was extremely abundant on the bluffs bordering the Mississippi River but, as far as observed, was not found on the landward (east) side of these bluffs, in ravines or depressions in the escarpment. The dissected bluffs in this area attain a height of 740 feet or more above sea level or 350 feet above the level of the bottom land of the Mississippi River. This species does not occur until a height of about 700 feet is reached. Here it occurs on very steep inclines, buried in the earth, at the base of rock outcrops, or under debris of various sorts. The ground was literally paved with dead shells in some places. At all localities in this area the species appeared to occur under the same conditions. At Fountain Bluff, Jackson County, the species is rare and is found only in one place in company with *Bulimulus dealbatus*. Here the colony is dying out, or may be already extinct, since only bleached, empty shells could be found. *P. dorfeuilliana* is now known to occupy a strip of territory about seventy miles in length bordering the Mississippi River, from Monroe southward to Jackson County.

In spite of the presence of this species in western Illinois, its occurrence in Kentucky is still an anomaly, especially as far east as the Cincinnati region. The Illinois colonies undoubtedly came across the Mississippi River from eastern Missouri, a fact strengthened by the presence of the species

in St. Louis County, Mo. As far as known it is not found in northeastern or eastern Arkansas. There is a gap of more than 300 miles between the supposed type locality and the nearest eastward range in Illinois. The species positively does not occur in any part of eastern or southern Illinois, for the writer and two other competent zoologists (Dr. Van Cleave and Mr. Foster) have collected in this area during three seasons, 1930-32, thus eliminating the possibility of a migration across southern or central Illinois. Further, it has not occurred in any of the very abundant fossil exposures studied by the Illinois State Geological Survey. It appears probable, therefore, that Dr. Pilsbry's statements in Proc. Phil. Acad., 1906, pp. 537, 538, still hold true and the solution of the Kentucky locality record is still as far away as before. If the species lives in either Kentucky or Tennessee at the present time it surely would have been found by the efficient collectors who have searched this prolific area for its land snail fauna.

I am indebted to Dr. H. A. Pilsbry for verifying the identifications of the two species in question, to Mr. Thural Dale Foster for assistance in collecting the material, and to Dr. T. H. Frison, Chief of the Illinois State Natural History Survey for the opportunity of collecting and studying the material.

MOLLUSKS OF MOOSE FACTORY

BY CALVIN GOODRICH

Scattered through Dall's report on the land and fresh water mollusca of Alaska are references to Moose Factory, the old Hudson's Bay Company's post at the head of James Bay. Twenty-seven species are credited to the locality. The collections that Dall examined were no doubt made by several travelers and the name Moose Factory was meant, in some instances, to cover an area of several hundred square miles.

Whiteaves (NAUTILUS, XIX, 1905, p. 4) gives a list of thirteen species of land and fresh water shells for three localities—Moose Factory, the mouth of Albany River and two miles above the mouth of Harricaw River. Albany River is about one hundred miles north of Moose Factory on the west side of James Bay and Harricaw River is fifty or sixty miles to the east. Four species among the thirteen are not among the Dall citations.

In August, 1932, I spent several days at Moose Factory. The post is on an island in Moose River about three miles above salt water. Because of good drainage through Devonian clays which are seamed with thin strata of limestone the vegetation is rather that of the Height of Land, far to the south, than of the mainland muskeg nearby. Terrestrial shells were fairly common in a grove to the north of the settlement, mostly under rotting birch logs, and among sticks and boards on the declivity between the post buildings and the river. Two bivalves were found in the river and three species of *Lymnaea* occurred plentifully on the shores, in pools and in small springs oozing from the banks. All the mollusks of the river and the lower river banks must have a considerable degree of resistance to marine conditions since, because of the low gradient, the salt water is driven up the river during northerly storms. The number of species taken was eighteen. Allowing for differences in identification of the same mollusks, six of these represent additions to the lists of Dall and Whiteaves. The names follow:

Discus cronkhitei anthonyi (Pilsbry). This is probably the *Pyramidula striatella* of Dall and Whiteaves.

Retinella hammonis (Strom). New.

Zonitoides nitidus (Müller). New unless some of the specimens determined as *Z. arboreus* (Say) by Dall and Whiteaves are of this species.

Cochlicopa lubrica (Müller).

Euconulus fulvus (Müller). New.

Pupilla muscorum (L.). New.

Vertigo pygmaea (Drap.). New.

Vertigo ventricosa (Morse). New.

Succinea haydeni Lea. *S. retusa* Lea is cited by Dall and Whiteaves.

Lymnaea arctica Lea. From a study of this lot, Mr. F. C. Baker has concluded that *arctica* is specifically distinct from *L. vahlii* Beck, Müller, with which he linked it as a subspecies in his monograph of the Lymnaeidae.

Lymnaea rustica Lea.

Lymnaea perplexa Baker and Henderson. "The specimens are nearly typical."—Baker.

Helisoma antrosum (Conrad).

Physa ancillaria Say.

Physa heterostropha Say.

Valvata tricarinata Say.

Sphaerium stamineum (Conrad). New. The specimens were compared with examples identified as *stamineum* by Dr. Victor Sterki, but my determination is possibly wrong.

Lampsilis siliquoidea (Barnes).

Among the loose boards near the post were numbers of a grayish-white slug which I believe was *Agriolimax agrestis* (L.). I cannot be certain of the identification because vials containing a score or two of the slugs were lost somewhere on the journey.

I am indebted to Messrs. Allan Archer, F. C. Baker and W. J. Clench for aid in identifications.

AMNICOLIDAE FROM WYOMING AND OREGON

BY HENRY A. PILSBRY

Some western Amnicolidae received from Professor Junius Henderson give occasion for the following notes.

AMNICOLA ROBUSTA (Walker). Plate 2, figs. 1, 7, 8.

Pomatiopsis robusta Walker, 1908, NAUTILUS, vol. 21, p. 97, text fig.

The type of this species was an unique shell from Jackson Lake, in northwestern Wyoming. Specimens taken there by Junius Henderson have been examined. Most of

them are somewhat wider than Walker's type, which measured, length 6 mm., diam. 3.5 mm. The two specimens now figured measure: length 5.2 mm., diam. 3.2 mm., and 5.9×4 mm.

The radula is that of *Amnicola,* and it is certainly not a *Pomatiopsis.* The central tooth has strongly trilobed basal margin, a single basal denticle on each side, and a cusp with 9 denticles. Lateral teeth with 7 denticles, the body with a median boss and prominent inner-basal angle. The spatulate outer uncinus has much smaller denticles than the reflected edge of the inner uncinus, and owing to foreshortening, the number of denticles was only approximately counted. Denticle formula $\frac{4.1.4}{1——1}$, 2.1.4, 20+—, 20+—.

Professor Henderson writes that "the lake was formerly very much smaller, before the erection of the great dam at Moran, and Hinkley almost certainly collected the type before it was enlarged. The most likely place for him to have found mollusks was at the southern end of the lake, near the present dam. I found our specimens not far inside the dam when the lake was nearly drained for irrigation, with *Lymnaea jacksonensis,* the types of which were also obtained by Hinkley. I had searched the same place several times at high water without finding any mollusks, as the shore line at that stage is not favorable, being too new."

AMNICOLA HENDERSONI, new species. Plate 2, figs. 2, 9, 10.

South of Burns, Oregon. Type 145951 ANSP., paratypes 145951*a*; and in Univ. Colo. Mus. and M.C.Z., collected by Mr. Geo. M. Benson; received from Junius Henderson.

The shell is perforate, long ovate, buffy olive. Spire rather short, conic, the apex a little obtuse. Whorls moderately and evenly convex, sloping from the moderately impressed suture. The surface is rather dull, nearly smooth, with very weak growth lines. Umbilicus quite narrow. The ovate aperture occupies somewhat less than half the total length. The peristome is thin, very slightly or not recurved at the columella, adnate above the umbilical fissure.

Length 4.7 mm., diam. 2.7 mm., aperture 2.2 mm. long; 4½ whorls. Type.

Length 4.4 mm., diam. 2.6 mm., aperture 2.1 mm. long; 4½ whorls.

The radula is similar to that of *A. robusta* (Wkr.) except that the central tooth (fig. 2) is much shorter, with more numerous denticles. The other teeth are much alike in the two species. Formula of denticles $\frac{6.1.6}{1——1}$, 1.1.4, 20+—, 20+—. Possibly the lateral tooth has the formula 2.1.4, but none of the teeth are in position to show this clearly in the two radulae mounted.

This species is about the size of *Paludestrina longiqua* (Gld.), but is quite different owing to the far less convex whorls, the less impressed suture and the closely adnate parietal margin of the peristome above the umbilicus. It is not nearly related to any of the western Amnicolidae enumerated in NAUTILUS, vol. 12, p. 121.

A specimen of *A. longinqua* Gld. is drawn in fig. 6 for comparison. It is from Indio, Cal. No. 61939.

AMNICOLA IDAHOENSIS, new species. Pl. 2, figs. 3, 4, 5.

Homedale, Owyhee County, Idaho. Type and paratypes 152677 ANSP., paratypes in Mus. Univ. Colorado. Collected by Mr. H. C. Tucker, and received from Prof. Junius Henderson.

The shell is rimate, elongate; buffy olive, fading to whitish at the summit. Apex slightly obtuse but not flattened; whorls at first strongly convex, the convexity gradually diminishing, the last two or three moderately convex in the upper part, becoming strongly convex below the periphery of the last. Surface smooth except for weak lines of growth. Aperture broadly ovate, oblique.

Length 7.7 mm., diam. 3.4 mm., aperture 2.6 mm. long; 6½ whorls. Type.

Length 5.4 mm., diam. 2.9 mm., aperture 2.3 mm. long; 5¼ whorls. Paratype.

Operculum ferruginous, fading towards the outer and basal edges, the nucleus at about the lower third and at the inner fourth of the width.

Radula generally similar to that of *A. robusta* (Wkr.), the denticle formula $\frac{4.1.4}{1——1}$, 2.1.4, 20+—, 30+—. In

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some rows the lateral tooth has 2.1.5 denticles. The notch at the outer end of the denticle row of the inner uncinus is not so distinct as in *A. robusta,* and the outer uncinus has somewhat finer denticulation (fig. 3).

While related to *A. robusta* (Wkr.) this species is distinct by the more slender shape and smaller aperture. The generic classification of such forms depends upon the form of the verge or external male organ, which is unknown in this species, *A. robusta* and *A. hendersoni;* but for the present they are considered to be Amnicolae of the subgenus *Marstonia* F. C. Baker, type *A. lustrica* Pils.

The eastern *"Paludina" nickliniana* Lea is more slender than *A. idahoensis,* with a deeper suture. According to F. C. Baker the verge differs from that of *Paludestrina* and *Hydrobia,* and he has revived for it the name *Stimpsonia* Clessin, 1878. As this is preoccupied in Crustacea and Vermes I propose to substitute *Fontigens,* type *Paludina nickliniana* Lea.

THREE NEW POLYGYRID SNAILS FROM CALIFORNIA

BY S. STILLMAN BERRY
Redlands, California

A very interesting new *Polygyra* which has just come to hand from nothern California impels me to submit in connection with it two other forms which I have had in manuscript for a considerably longer period of time.

POLYGYRA TRACHYPEPLA, new species. Pl. 2, figs. 12, 12*a*.

Description: Shell small, depressed, thin, imperforate. Embryonic whorls with first half-turn smooth and vitreous, the second half-turn less transparent and showing a few weak concentric wrinklings together with a gradually developing system of minute papillae which on succeeding whorls become much larger, elongate, then almost confluent, and eventually somewhat crescentic and bearing more or less deciduous scale-like excrescences above; there is evidence of a double arrangement of these in forward-slanting series on the one hand and approximately axial or con-

centric lines on the other, but it does not proceed quite far enough for the formation of actual ribs; papillae numerous on base of shell as well but there more minute. In cleaned specimens which have lost the scales traces of a weak spiral striation may be observed. Whorls 5, narrow, convex, with the suture deeply impressed. Body-whorl subangulate at the shoulder, strongly tumid below, only slightly descending to the aperture, behind which it is abruptly and narrowly constricted. Aperture ovate, the peristome only moderately thickened, flattened below, and bearing two small whitish denticles, one basal and one above it on the outer lip, in addition to the slightly larger, oblique and high-placed parietal denticle. Color of periostracum snuff brown, the lip pale brown to whitish.

Max. diam. 7.6, min. diam. 7.4, alt. 4.3 mm.

Holotype: Cat. No. 6170 of the writer's collection. *Type Locality:* Vicinity of Bridge Creek Lumber Camp, south of Scotia, Humboldt County, California; James Cunningham collector, July-August, 1926.

Remarks: This species somewhat resembles *germana* but the shell is a trifle larger and flatter, imperforate, and the parietal tooth smaller, while the very different periostracal ornamentation suggests an approach toward *loricata*. I know nothing closely like it in our western fauna.

POLYGYRA LORICATA NORTENSIS, new subspecies. Pl. 2, figs. 14, 14*a*.

Description: Shell small, depressed, thin, perforate. Whorls 4¾ to 5¼. Embryonic shell weakly concentrically wrinkled, the wrinkles much broken, soon becoming closer and heavier, and eventually passing into the general sculpture-system of many low, closely placed, crescentic tubercles, trending like the growth-lines which are otherwise hard to make out, and overlying the very close and fine spiral striation. Body-whorl tumid, subangulate at the shoulder, weakly descending and abruptly and deeply constricted behind the lip. Aperture ovate, the peristome hardly thickened except for two small teeth (sometimes not more than whitish thickenings), one basal, the other above it on the outer lip. Parietal tooth a small oblique whitish denticle which may be represented by a mere trace. Umbilicus narrow, nearly straight-walled, partly covered by the peristome. Color of periostracum near tawny-olive of Ridgway.

Max. diam. 6.4 mm., min. diam. 5.6 mm., alt. 3.6 mm., diam of umbilicus 0.5 mm.. Whorls 5.

Holotype: Cat. No. 7456 of the writer's collection. *Paratypes:* Cat. No. 7457 of same collection, and No. 2220, collection of Allyn G. Smith. *Type Locality:* Terwah, near Requa, Del Norte County, California; 5 specimens, Allyn G. Smith, collector, August 4, 1921.

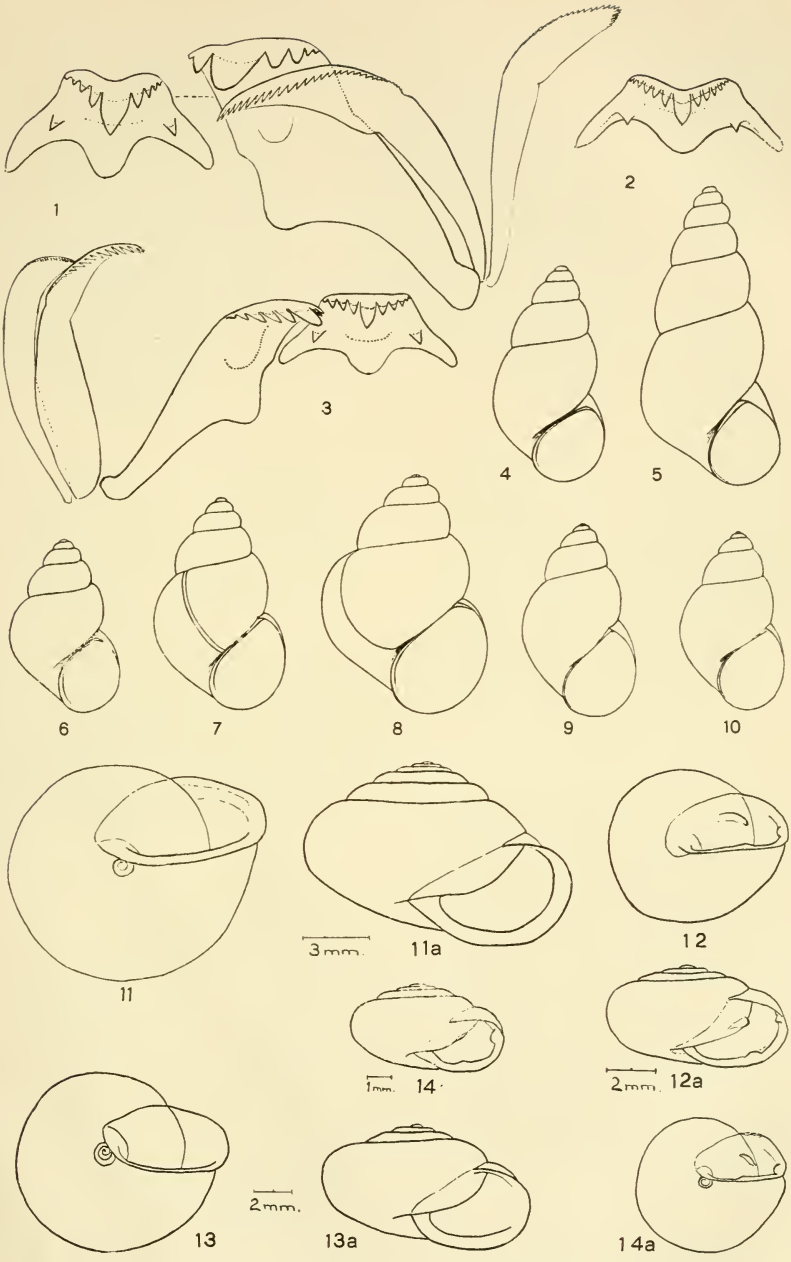
Remarks: This seems a reasonably well defined race differing from typical *loricata* of the San Francisco region in being smaller, with a thinner lip, less open umbilicus, and reduced apertural dentition, the parietal tooth often indeed no more than a trace. The sculpture is altogether finer, more even, and less crude than the rough scaly ornamentation of the typical form.

POLYGYRA HAPLA, new species. Pl. 2, figs. 13, 13*a*.

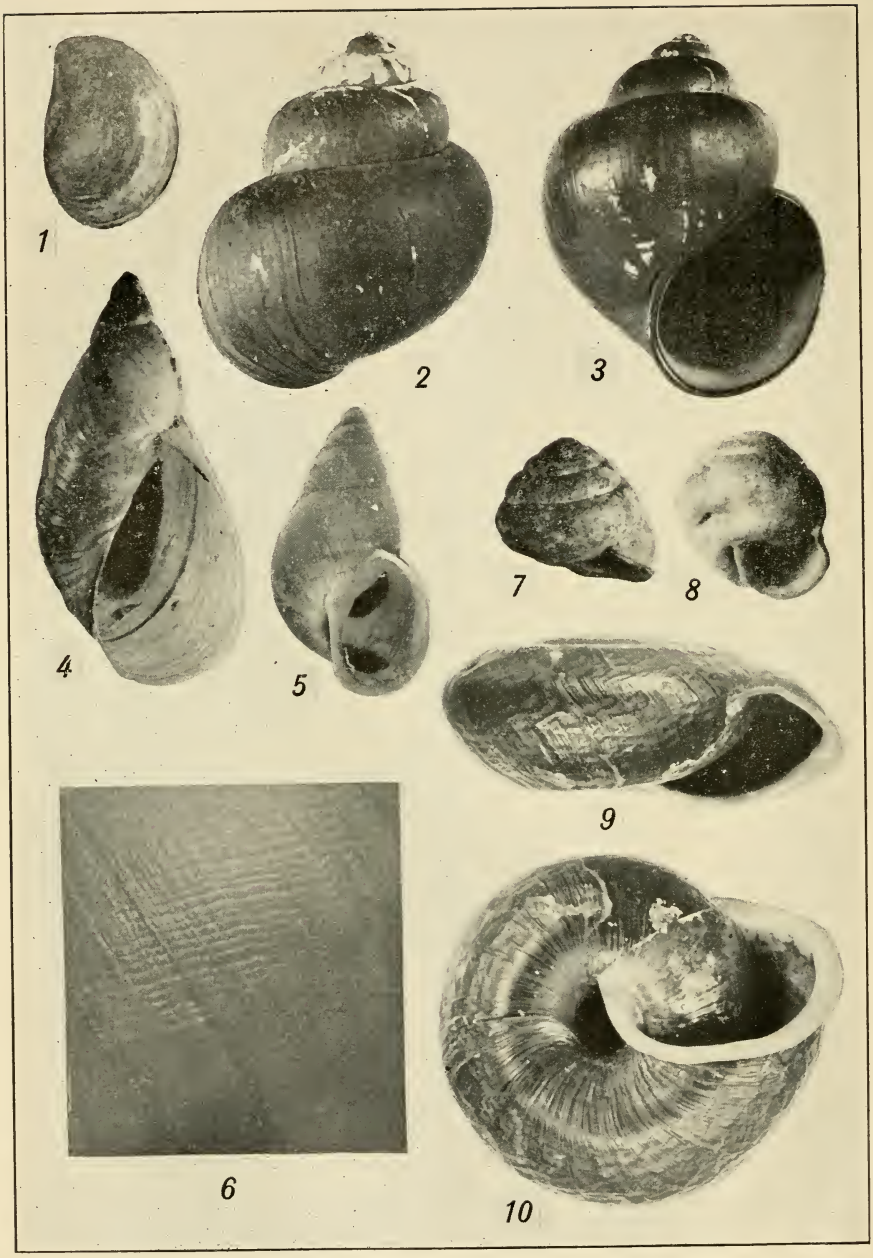
Description: Shell small, depressed-conic, thin. Growth-lines numerous, irregular and somewhat coarse. Embryonic whorls transparent, polished, smooth except for the very weak growth-lines. Later whorls with rather large distant papillae, each bearing a stout periostracal hair when first formed, but the hairs eventually becoming generally dehiscent in the later stages. Spire low, the slopes nearly straight. Whorls about 5¼, strongly convex, with deep sutures. Body whorl slightly shouldered, weakly descending to the aperture, and suddenly narrowed just back of the peristome by a furrow-like constriction; base moderately tumid. Lip light brown, rather narrow, well reflected anteriorly and below, but only moderately thickened; angled and slightly narrowed below the pillar. Umbilicus permeable to apex, but narrow, contained 8 to 9 times in the major shell diameter; only slightly encroached upon by the columellar reflection. Color of shell near snuff brown of Ridgway.

Holotype: max. diam. 12.2 mm., min. diam. 10.3 mm., alt. 7.2 mm., diam. umbilicus 1.4 mm.; 5¼ whorls. Paratypes measure: 11.8×10.1×6.6 mm., umb. 1.4 mm.; 5¼ whorls.; 11.6×9.7×7.2 mm., umb. 1.4 mm.; 5¼ whorls; 11.4×9.6×6.5 mm., umb. 1.2 mm.; 5¼ whorls; 11.1×9.3×6.3 mm., umb. 1.2 mm.; 5 whorls; 10.9×9.2×6.4 mm., umb. 1.4 mm.; 5¼ whorls; 10.3×8.6×6.2 mm., umb. 1 mm.; 5¼ whorls.

Holotype: Cat. No. 7440 of the writer's collection. *Paratypes:* Cat. No. 7436 of same collection. *Type Locality:*



Pilsbry: Amnicolidae from Wyoming and Oregon
Berry: Polygrid Snails from California



Figs. 1-3. Viviparus contectoides goodrichi. 4. Succinea sanibelensis.
5, 6. Partula paravicinii. 7, 8. Cepolis torrei. 9, 10. Chloritis atalanta

Butte Creek Canyon, about 10 miles from Chico, Butte County, California; 12 living adults, 6 juveniles, Jan. 14, 1933; 18 living adults, 32 juveniles, 4 dead shells, Feb. 5, 1933; Prof. L. G. Ingles collector.

Remarks: This quite distinct little *Polygyra* appears to require no especially close comparison with any of the Californian representatives of the genus hitherto known. In general effect one may picture it as a small, depressed, narrow-lipped, umbilicate, toothless *columbiana,* without the fine close pelage possessed by southern forms of the latter species, but the *umbilicus* is of entirely different type from what we see there as is the periostracal ornamentation, and I think it at best doubtful whether it is in that direction that its near affinities properly lie.

POLYGYRA COLUMBIANA ORIA, new subspecies. Pl. 2, figs. 11, 11*a*.

Description: Shell low-conic, narrowly umbilicate, the umbilicus partially covered by the columellar reflection; aperture rounded, flattened basally, without teeth; peristome of moderate width, narrowed and somewhat angled below the columella; parietal callus usually simple and but weakly arcuate. Periostracum finely but rather weakly pilose, lustrous, the color a nearly uniform Saccardo's umber.

Holotype: Max. diam. 14.7 mm., min. diam. 12.4 mm., alt. 10.3 mm., diam. umbilicus 12 mm.; 6 whorls. Paratypes measure: 16.4×14.3×11.5 mm., umb. 1 mm.; 6¼ whorls; 15.1×13×11 mm., umb. 1,2 mm.; 6⅛ whorls; 14.7×12.3×9.3 mm., umb. 1 mm.; 5¾ whorls; 14.6×12.2×9.3 mm., umb. 1.1 mm.; 5⅞ whorls; 14.3×12×9.1 mm., umb. 1.2 mm.; 5⅞ whorls; 13.1×10.8×8.5 mm., umb. 1 mm.; 5¾ whorls.

Holotype: Cat. No. 7441 of the writer's collection. *Paratypes:* Cat. No. 6137 of same collection, others in collection of Allyn G. Smith. *Type Locality:* South fork of American River Canyon, near Riverton, Eldorado County, California; Allyn G. Smith collector, July 4, 1925.

Remarks: The mid-Sierran shells of *columbiana* type are not very strongly differentiated, but in their own way the characters appear constant throughout the considerable

series seen and it is believed that a name for the race will be found of service. From all Californian coastal forms seen *oria* differs in its darker and browner coloring, weaker and more distinct pilosity, and polished surface.

A series taken by Mr. Smith in the vicinity of Riverton, May 21, 1916 (Cat. No. 3734) and another collected by him near Camp Creek, 3 miles east of Pleasant Valley, Eldorado County, July 11, 1926, average considerably smaller than the material described but otherwise seem essentially similar.

TEXAS SHELLS

BY E. G. VANATTA

The following species were picked from two samples of river drift collected by Doctor Julia Gardner. Specimens are in the collection of the Academy of Natural Sciences of Philadelphia.

FRIO RIVER ONE MILE ABOVE FRIO, FRIO CO., TEXAS

Helicina orbiculata tropica Pfr.
Polygyra texasiana (Moric.)
Thysanophora hornii (Gabb)
Bulimulus dealbatus mooreanus (Pfr.)
Bulimulus alternatus mariae (Alb.)
Holospira roemeri (Pfr.)
Retinella indentata paucilirata (Mrl.)
Hawaiia minuscula (Binn.)
Hawaiia m. alachuana (Dall)
Helicodiscus singleyanus (Pils.)
Helicodiscus nummus (Van.)
Pupoides marginatus (Say)
Gastrocopta contracta (Say)
Gastrocopta pentodon (Say)
Gastrocopta procera (Gld.)
G. pellucida hordeacella (Pils.)
Strobilops texasiana P. & F.
Succinea luteola Gld.
Pseudosuccinea columella (Say).
Helisoma trivolvis lentum (Say)
Tropicorbis liebmanni (Dkr.)
Planorbula obstructa (Mrlt.)
Carychium exiguum (Say)

RIO GRANDE, MAVERICK CO., ABOUT EIGHT MILES ABOVE THE WEBB CO. LINE

Polygyra texasiana (Moric.)
P. t. texasensis Pils.
Thysanophora hornii (Gabb)
Holospira mesolia Pils.
Holospira roemeri (Pfr.)
Rctinella indentata paucilirata (Mrl.)
Hawaiia minuscula (Binn.)
H. m. alachuana (Dall)
Helicodiscus singleyanus (Pils.)
Helicodiscus nummus (Van.)
Pupoides marginatus (Say)
Gastrocopta contracta (Say)
G. procera (Gld.)
G. cristata (P. & V.)
G. pellucida hordeacella (Pils.)
G. pentodon (Say)
Gyraulus carus (P. & F.)
Drepanotrema cultratum labrosum Pils.
Planorbula obstructa (Mrlt.)

A NEW SPECIES OF FLORIDA UNIO

BY BERLIN HART WRIGHT

UNIO (ELLIPTIO) SANCTORUMJOHANIUM, sp. nov. Plate 1.

Shell uniomorphic, reddish, polished, smooth but with bluntly rounded growth ridges. Disc all covered with bright dark green rays collected in ribbon-like bands, almost obscuring the basic epidermal color, especially in the younger, translucent individuals. Epidermis extremely glaucous throughout and glabrous. Form inequilateral, oval, slightly but distinctly biangulate behind and posterior or umbonal ridge well defined but not sharp, and beak sculpture prominently and irregularly sinuate and deeply corrugate. Dorsal margin slightly arched, ventral and posterior margins gracefully rounded, and blunt in front. Cardinal teeth oblique, pointed, finely corrugate, double in left and single in right valve as are also the arched laterals which are well separated from the cardinals and are beautifully and finely sculptured. Pallial impressions distinctly marked and very regular. Posterior cicatrix narrow and smooth posteriorly, and deep auxiliary cicatrix. Anterior cicatrix shallow, poorly defined and smooth. Umbonal cavity fairly deep with four cicatrices in a row at its roof. Nacre brilliantly irridescent with bright coppery hues throughout.

Dimensions: Length 65 mm., altitude 40 mm., diameter 25 mm.

Habitat: Lake Druid, near Floral City, Florida, on which front are located the winter homes of the brothers Robert and Edward St. John, in whose honor this extremely lovely naiad is named since they are both students of nature and brought the species to our notice.

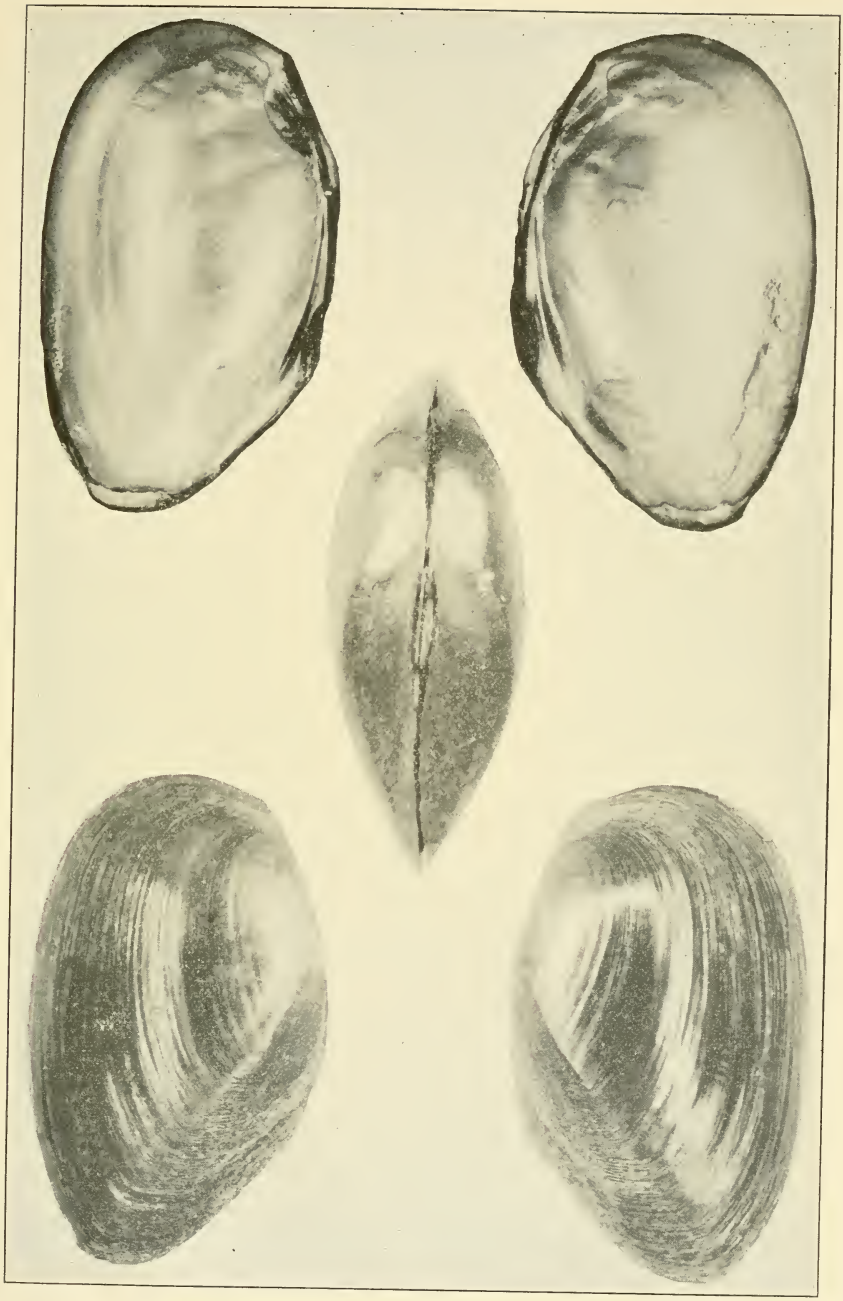
Observations: The natural place in the family lies between *U. hinkleyi* Wright and *U. pinei* Wright, both east Florida forms. It has the outline of the first and nacrous and epidermal brilliancy of the last. It comes from a water surcharged with lime and yet there is never any calcareous deposit on the shells.

The type is the collection of the United States National Museum, No. 424738, also a paratype, No. 424739. Other paratypes are in the Academy of Natural Sciences at Philadelphia, No. 161016, and in the collection of Walter F. Webb of Rochester, N. Y., who has entered upon the collection and study of the Unionidae with characteristic zeal and thoroughness. Still other paratypes have been placed in the Buffalo Academy of Sciences and the Museum of Comparative Zoology.

A NEW VARIETY OF VIVIPARUS CONTECTOIDES (W. G. BINN) FROM JACKSON CO., FLORIDA

BY ALLAN F. ARCHER

In a sending from O. C. VanHyning, the Museum of Comparative Zoology received two species of Viviparidae. They were collected in streams in the vicinity of Marianna, Jackson County, Florida. *Campeloma floridense* "Call" Pilsbry was collected in a creek tributary to the Chipola River, 5 miles northeast of Marianna, and in Spring Creek, 3 miles southeast of Marianna. In the former locality it is rather elongated, much like *Campeloma lewisii* Walker. In this respect it is like the specimen from the R. E. Call collection now in the M.C.Z. (No. 4476). However, it exhibits



Unio (Elliptio) sanctorumjohanium B. H. Wright

even more strongly incised spiral lines at least in some specimens, although others differ little in that respect. The examples from the other locality mentioned above are somewhat shorter spired. The label accompanying Call's shell gives East Florida as the locality. The description of this species first appeared in the literature by Dr. Pilsbry (NAUTILUS 30, 1916, pp. 42-43).

VIVIPARUS CONTECTOIDES GOODRICHI, var. nov. Pl. 3, figs. 1-3.

Description: Shell elongate-globose, imperforate or very narrowly rimate, dextral. Exterior of shell dark brown. Three very dark brown bands visible in some individuals, one central one at the periphery and one above and below it. The entire edge of the aperture black, this color continuing along the edge of the parietal callus. Th interior of the aperture purplish brown, with the bands often showing through. The texture of the interior of the aperture slightly nacreous. Whorls about 4½. Nuclear whorls prominent, but usually badly corroded and pitted; succeeding whorls moderately increasing, quite convex and definitely shouldered; body large and broadly shouldered, the area beneath the shoulder bulging but slightly. Aperture subcircular, oblique. Palatal lip thin and unexpanded and merging directly with the columellar lip. Parietal callus present with an exterior border continuous with the columellar lip and connecting directly with the superior insertion of the palatal lip. Suture impressed. Sculpture consisting of closely crowded axial lines which at irregular intervals on the body whorl are interrupted by raised growth lines. Surface texture rather smooth and in younger specimens somewhat shiny. Operculum subcircular, oblique, horny, somewhat transparent, with concentric lines and subcentral nucleus,

Altitude 46 mm., diameter 37 mm., aperture length 25 mm., width 18.5 mm. Holotype, M.C.Z. In two paratypes, M. C. Z., the dimensions are: 46×38×24×19.5 mm., and 43.5×38×22.5×18.5 mm.

Holotype: M.C.Z. 92432 (fig. 3); spring fed stream tributary to the Chipola River, 5 miles northeast of Marianna, Jackson Co., Fla., O. C. VanHyning collector, November 16, 1932. *Paratypes:* M.C.Z. 92433.

Remarks: This variety may readily be distinguished from

V. contectoides W. G. Binn. in the following respects. It is larger and more globose. The whorls are broadly shouldered instead of being rounded and convex. Moreover it is not umbilicate as in *V. contectoides.* The color is dark brown instead of the apple green of the typical form of the species. The aperture is less circular and more oblique. It more closely resembles *V. contectoides impolitus* Pils., a form from Alabama. It may be distinguished from it in the following points. The shell is somewhat larger and stouter. The whorls are more broadly shouldered. The umbilical perforation is absent, and the umbilical region bulges outward more. The surface is smoother instead of being rough and malleated. The aperture is less circular. *V. contectoides limi* Pils. is smaller, much more elongate with more compactly coiled whorls.

A NEW SUCCINEA FROM FLORIDA

BY HARALD A. REHDER[1]

While going over the collection of *Succinea* at the Museum of Comparative Zoology at Harvard University, several lots were found from the west coast of Florida that seem to belong to a new form that is here described.

SUCCINEA SANIBELENSIS, new species. Pl. 3, fig. 4.

Description: Shell elongate, slender for the genus, with an acute spire; glossy, whitish yellow or straw-yellow in color, the shells with the former color being quite thin and fragile, while those of a straw-yellow color are somewhat less fragile. Whorls 3¾ to 4, generally 4, only slightly convex, so that the sides of the shell above the periphery of the last whorl seem almost flat; suture moderately deep. Sculpture consists of minute growth lines, and fine, low, irregular wrinkles. Aperture narrowly ovate, practically vertical, and almost symmetrical.

Length 14.4 mm., breadth 7.3 mm., length of aperture 9.6 mm. Holotype. 16.3 mm., 7.9 mm., 10.4 mm. Paratype. 15.0 mm., 6.8 mm., 9.5 mm. Paratype.

[1] Published by permission of the Secretary of the Smithsonian Institution.

Holotype: M.C.Z. No. 59645, from Sanibel Island, Lee County, Florida, collected by W. F. Clapp in 1911. Paratypes are in the Museum of Comparative Zoology and in the United States National Museum, No. 424706. There are other lots from the same locality, and one lot of large, straw-yellow specimens labeled merely "Sawgrass swamps, Southeastern Florida."

Remarks: This form can not be mistaken, after a little study, for any other species. *S. retusa* has practically always a much shorter spire and longer aperture. *S. luteola* has a more broadly ovate aperture, due to the fact that typically the columella makes a more or less definite angle with the parietal wall. *S. sanibelensis* has also some slight resemblance in color and texture to *S. concordialis*, but here again the more flattened whorls give *sanibelensis* a more slender appearance.

A NEW FOSSIL CEPOLIS FROM CUBA: WEST INDIAN MOLLUSKS NO. 6

BY W. J. CLENCH AND C. G. AGUAYO

The following species of *Cepolis* was collected by Dr. Thomas Barbour in a cave of the Sierra de Hato Nuevo, a low range of hills about 5 km. southwest of Marti, Matanzas, Cuba. The single specimen was found associated with some mammal bones. Dr. Barbour reports that the region of the cave is considered late Pliocene or early Pleistocene. No closely related recent species occurs anywhere near this area. The nearest form is *Cepolis* (*Jeanneretia*) *subtussulcata* ("Wr." Pfeiffer) from Viñales and Guira de Luis Lazo, west central Pinar del Rio, which is about 300 km. to the west. No other fossil species in this subgenus is known to occur. It is possible that this species is the ancestral form of the present *C. subtussulcata*, which at this time is localized in the western end of the island.

CEPOLIS (JEANNERETIA) TORREI, sp. nov. Pl. 3, figs. 7-8.

Description: Shell globose, imperforate, solid. Whorls 6½, convex, body whorl very indistinctly angled. Spire dome-shaped, very slightly obtuse and produced at an angle of 96°. Aperture rounded, cast at an angle of 41° with the horizontal plane. Lip well reflected. No apparent columella as the basal area of the lip ascends at a sharp angle toward the columellar region. The incomplete folding of the lip leaves a rather long but not deep rimation, which, however, does not penetrate the axis. Sutures well impressed. Sculpture showing but very indistinctly the fine thread-like spiral incised lines characteristic of the subgenus *Jeanneretia*. No trace of color remaining. A rather deep, crescent-shaped pit is located midway on the basal area of the body whorl between the columellar region and the outer margin of the shell. This is produced by infolding and the production of a corresponding raised tooth well within the aperture. It is 11 mm. long between its points of insertion.

Length 20.5 mm., greater diam. 21 mm., lesser diam. 19.5 mm., aperture length 9.5 mm., width 9 mm. Holotype.

Holotype: M.C.Z. No. 59730, cave in the Sierra Hato Nuevo, near Marti, Matanzas Province, Cuba. T. Barbour, collector, 1917.

Remarks: This species is best compared with *Cepolis* (*Jeanneretia*) *subtussulcata*. Proportionately *C. torrei* is far more globose, much smaller, and has a less obtuse spire. Comparative measurements of certain angles are:

	C. torrei	*C. subtussulcata*
Spire	96°	103°
Aperture	41°	34°

This last measurement is the cast of the angle produced by the face of the aperture with the horizontal line drawn at right angles with the axis of the shell at its extreme base, as seen in right profile.

C. torrei is named for Dr. C. de la Torre, the well known Cuban malacologist.

TWO NEW LAND SNAILS FROM THE BISMARCK ARCHIPELAGO

BY WILLIAM J. CLENCH

The following new species were recently received from Dr. E. Paravicini among a series of shells submitted for naming. This collection had been made by Dr. Paravicini during a collecting trip in the Western Pacific.

CHLORITIS (SULCOBASIS) ATALANTA, sp. nov. Pl. 3, figs. 9-10.

Description: Shell widely umbilicated, rather solid, discoidal, and somewhat shining. Color mahogany brown. Whorls 5, body whorl broadly angled above the mid-area. Below the angle, the whorl is convex, above it is flat to slightly concave, with the extreme upper portion of the body whorl shouldered. Spire completely depressed, hardly showing above the body whorl. Lip reflexed, thickened and colored a pale purplish brown. Parietal wall very thinly glazed. Aperture reniform to auriculate, cast at an angle of 48° from a horizontal line. Umbilicus deep and slightly tapering. Columella exceedingly short, expanding above and covering about a third of the umbilical opening. Sculpture on exposed portions of early whorls of very fine and numerous growth lines. Body whorl other than shouldered and basal areas coarsely malleated, the malleations set somewhat obliquely and crossed by the fine growth lines. Shouldered and basal areas crossed only by the fine and slightly irregular growth lines.

Height 26 mm., greater diam. 54 mm., lesser diam. 48.2 mm., aperture diam. 26 mm. Holotype.

Holotype: M.C.Z. No. 59844, New Hanover Island, Bismarck Archipelago, E. Paravicini collector. Paratype in collection of E. Paravicini.

Remarks: This species differs rather notably from all other members of this genus known to occur within the region of eastern New Guinea, the Bismarcks and the Solomon Islands. It is most nearly allied to *Chloritis* (*Sulcobasis*) *majuscula* Pfr. from Bougainville Island in the Solomon group. From this species it differs by being very much larger, more heavily malleated and having a much darker color. The umbilicus in this form tapers within rather gradually, paralleling the condition found in *Chloritis* (*Sul-*

cobasis) *isis* Pfr., and not so definitely obconic as in *C. majuscula.* From *C. isis,* the only other form to which it at all approaches, it differs in possessing the heavy malleated sculpture, much darker and more uniform coloration, a flatter spire and being very much larger.

PARTULA PARAVICINII, sp. nov. Pl. 3, figs. 5-6.

Description: Shell rather thin, umbilicate, shining. Color deep red-brown on the first 1½ whorls then shading rapidly into yellow-brown and finally to light yellow-brown on the last whorl. Whorls 5, quite convex, regularly enlarging to the body whorl. Spire attenuated and acute. Lip white and well reflexed. Parietal wall thinly calloused. Aperture ovate and slightly obliquely set, cast at an angle of 65° from a horizontal base line in right profile. Columella bearing slightly to left, expanded above and inwardly, reflected portion completely covering the umbilical orifice when viewed from the face of the shell. Sculpture of numerous and rather deeply incised wavy, spiral lines, crossed by irregularly spaced and somewhat inconspicuous growth lines.

Measurements: Height 18.7 mm., width 10.3 mm., aperture 8.1×4.8 mm. Holotype. Three paratypes measure: 18×9.3 mm., ap. 7×4 mm.; 18.2×9.6 mm., ap. 8.8×4.5 mm.; and 17.6×9.1 mm., ap. 8.8×4.4 mm.

Holotype: M.C.Z. No. 59854, St. Matthias, Bismarck Archipelago, E. Paravicini collector. Paratypes, M.C.Z. No. 59855; ANSP. and the collection of E. Paravicini.

Remarks: Closely allied to *P. gerardensis* Soos from Gerard de Nys [Gerret Denys] Island and *P. carterensis* Q. & G., from Port Carteret, New Hanover, in the Bismarcks. It differs from both species by being proportionately less elongated, having a sculpture throughout of much heavier axil lines and possessing a deep, brown-red nuclear whorl. This new species is a member of the Solomon-Bismarck Island complex of the genus *Partula,* a group of more or less very closely allied forms having rather slender shells, and usually fine spiral sculpture.

MOLLUSKS OF THE PLIOCENE DEPOSITS AT COLLINSTON, UTAH

BY RALPH V. CHAMBERLIN AND ELMER BERRY,
University of Utah

Of the post-Eocene lake deposits so widespread in the west, those of the Great Basin region were first and are still chiefly known from King's reports in the U. S. Geological Exploration of the Fortieth Parallel. King indicated certain extensive deposits of Pliocene age as having been laid down in a great sheet of water lying chiefly in Nevada to which he applied the name Shoshone Lake. The margins of this lake touched southeastern Oregon, eastern and southeastern California, and the western half of Utah. The deposits made in this lake, the limits of which have never been definitely plotted, have commonly been designated as the "Humboldt Group." Frank B. Meek as long ago as 1870 reported extensive studies on the molluscan fauna of the extinct lake, particularly from deposits at Fossil Hill, Kawsoh Mts. of Nevada, and from Cache Valley, Utah.

The writers have devoted considerable time to an investigation of the molluscan fossils of this formation in various exposures in Utah and Idaho; and the present paper is a report upon our findings in a conspicuous outcropping at Collinston, Utah. This deposit seems clearly continuous with that at Mendon, in Cache Valley, thus Pliocene strata bending about the north end of the Wasatch Range from one locality to the other.

The tertiary outcropping in Collinston, Utah, is similar in formation and fauna to that occurring further east near Mendon, Utah, the locality visited by Meek. The Collinston outcropping is several hundred feet in height and is composed chiefly of conglomerates and oolitic sands. Unfortunately the molluscan remains at most levels are composed of molds and casts in the conglomerates, making identification of the species very difficult. We found a stratum, however, situated about midway between the base and the summit of the mountain, which is composed of fine, unconsolidated sands and yielding fossil shells in good condition and in

large numbers. The majority of the specimens of this stratum are species which are small in size or immature shells of larger species. It is from this stratum that most of the species listed in this paper were obtained. Types of all new species are in the museum of the University of Utah.

We wish to extend our thanks to Dr. Walter P. Cottam for aid in photographing the specimens.

PISIDIUM COMPRESSUM Prime. Pl. 5, fig. 1.

A number of valves of this species were found in the fine sand. Occasionally both valves were found intact.

SPHAERIUM PILSBRYANUM Sterki. Pl. 5, fig. 2.

A few specimens found. They are of smaller size than the adult forms found living at the present time. The largest found is 10.4 mm. long by 8.7 mm. high.

STAGNICOLA KINGI (Meek). Pl. 5, fig. 3.

Several molds and a few well preserved casts have been discovered in the consolidated oolitic sands and conglomerates. No actual complete shells were found, however, at this locality. This species became a dominant form during the Pleistocene in Lake Bonneville. It is living at present in two widely separated districts, one in Utah Lake on the west shore, the other in northern Utah near Promontory.

PHYSA sp. Pl. 5, fig. 4.

This is a juvenile form. Although it appears to be different from any described species, we think it advisable to postpone giving it a name until better material makes possible an adequate description.

VORTICIFEX LAXUS sp. nov. Pl. 5, fig. 5.

This species, although common in the conglomoritic deposits, was absent in the sands. The description of the species is taken from the aspects which the mold and the casts reveal. Specimens with the shell present have not been taken by us.

Description: Shell large and varying from a depressed spire to a low spire. Whorls 3½ to 4. The sutures evident-

ly deep causing the mold to be loosely coiled. The last whorl large but lacking the terraced shoulder that is present on *Carinifex newberryi* (Lea) which it somewhat resembles. There is no evidence of a sharp carina surrounding the umbilicus as is present on *C. newberryi.* Aperture is triangular-ovate, large and expanding, having its widest dimensions at the periphery. Umbilicus very narrow. *Size:* 21.8 mm. wide; 21 mm. high; penultimate whorl 11.4 mm. wide; aperture 16 mm. high, 12.3 mm. wide.

This species appears to be related to *Vorticifex binneyi* (Meek) but differs from that species in that the whorls increase less rapidly in size, in the shape of the aperture (*binneyi's* aperture being widest above), in the height of the spire, and in the width of the umbilicus.

VORTICIFEX TRYONI CONCAVA Meek. Pl. 5, fig. 6.

Three specimens of this form were found in the fine sands. All three have the characteristic transverse costae, but are not fully mature shells. The largest specimen had 3¼ whorls and measured 3.4 mm.

GYRAULUS MONOCARINATUS sp. nov. Pl. 5, figs. 7 and 8.

Description: Shell small, discoidal, composed of 2½ to 3 whorls which increase rapidly in size. Nuclear whorl round and non-carinated. The last two whorls are strongly keeled above the periphery causing the upper portion of the whorls to slope downward to the sunken spire. The upper portion of the body whorl is channeled between the keeled body whorl and penultimate whorl. Below the carina the body whorl is well rounded. The umbilicus is excavated allowing all the whorls to be seen from beneath. Aperture, angulate, large, and wider than high. *Size:* 3.8 mm. wide, 1.9 mm. high.

This species, with its characteristic keel does not seem to be closely related to any species that we are familiar with. It was found to be rather common in the fine sand strata and also in the coarse, unconsolidated sands.

GYRAULUS ANNECTANS sp. nov. Pl. 5, figs. 9 and 10.

Description: Shell small composed of 2¼ to 2½ whorls which increase very rapidly in size, the last comprising most of the shell. The whorls are loosely coiled and sculptured with evenly placed transverse costae. Spire sunken,

protoconch extremely small, gradually increasing in size with the younger whorls. Body whorl abruptly rounded. Umbilicus wide and circumscribed with a well defined carina. Aperture obtusely ovate, wider than high, slightly everted on adult forms. *Size:* 4.5 mm. wide, 1.6 mm. high; penultimate whorl 1.3 mm. wide; aperture 2.5 mm. wide, 1.6 mm. high.

This species has combined characteristics of the genera *Gyraulus* and *Carinifex* not fitting perfectly into either one as they are now established. It differs from *Gyraulus* in having a carina surrounding the umbilicus, but differs from *Carinifex* in not possessing a terraced spire and in the shape of the aperture. The species was well represented in the fine sand strata and in the coarse sand directly above associating with the last species described, *Gyraulus monocarinatus.*

LANX UNDULATUS (Meek). Pl. 5, fig. 11.

Several specimens of this species were found, none, however, being as large as that of the type species as described by Meek from Fossil Hill, Kaw-soh Mountains, Nevada. The largest specimen found measured 9.1 mm. long; 7.6 mm. wide; and 6.4 mm. high. Undulations were well developed on most of the specimens and the contour of the shell including the position and shape of the apex are similar to the species as described by Meek. It is no longer living in the Great Basin.

AMNICOLA LIMOSA (Say). Pl. 5, fig. 12.

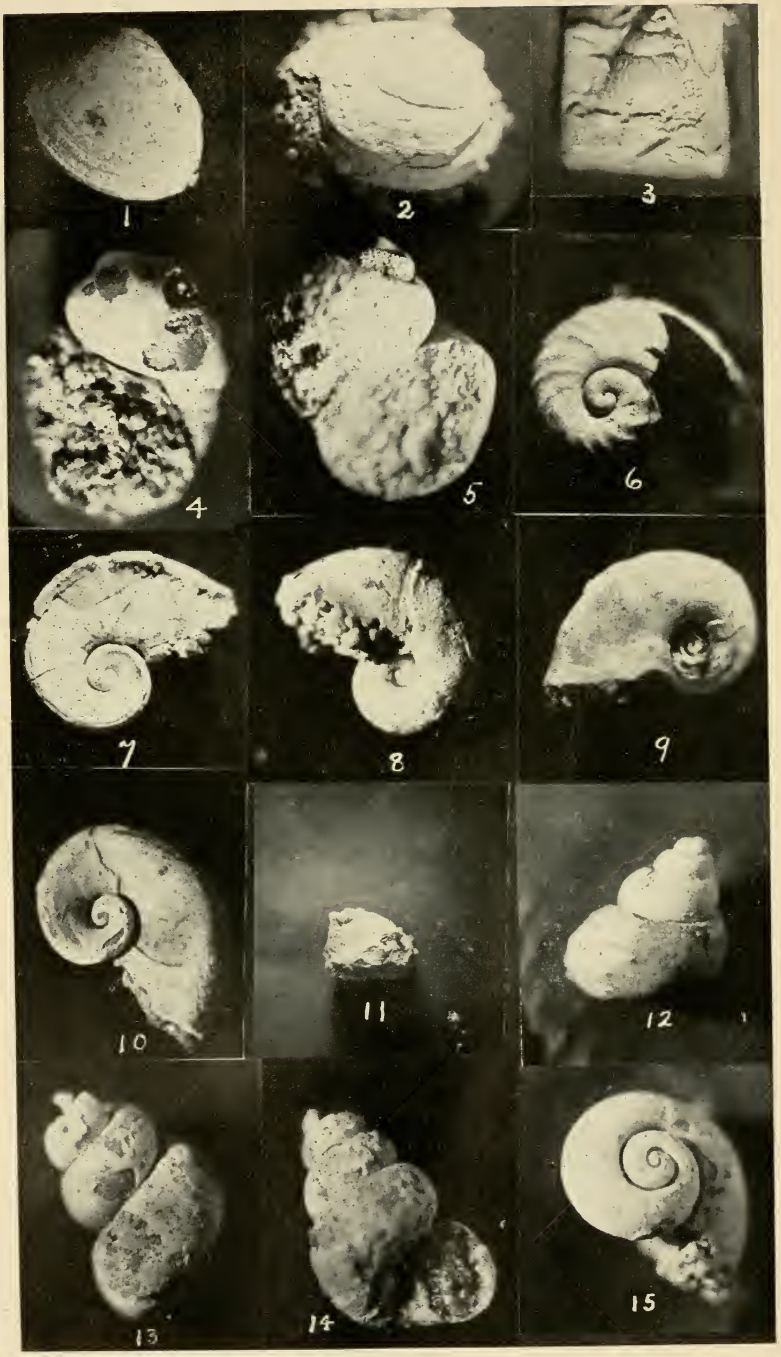
A few well preserved specimens were found of this species in the coarse, unconsolidated sands. This species is still living in a few isolated districts of Utah, e.g., Salt Springs, Utah.

PALUDESTRINA NANNA sp. nov. Pl. 5, figs. 13 and 14.

Six specimens of this species were found in the fine sands and in the strata directly above. Only two had their shells remaining. The other specimens had some portions of the shell present but were mostly composed of the molds.

Description: Shell small, rimate, narrowly elongate. Whorls 4½ to 5, somewhat shouldered, convex, nearly

UPPER—Hill at Collinston, Utah.
LOWER—Nearer view of a portion of the hill to show the characteristic dip and the sandy layers between more consolidated strata.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smooth, and separated by a well impressed suture. Aperture sub-circular, continuous; apex blunt. *Size:* 2.7 mm. high, 1.4 mm. wide.

This species resembles *Paludestrina protea* in general shape, but differs in being much smaller, in the rimate umbilicus, and in lacking the revolving ridges and longitudinal folds.

VALVATA HUMERALIS CALIFORNICA Pilsbry. Pl. 5, fig. 15.

This was a comparatively common form during the Pliocene time. We have found this to be widely distributed in our collections of the Pliocene Mollusca in the Great Basin Area. This species was found as molds in the lower deposits of Collinston and perfect specimens were taken from the fine sands and unconsolidated strata from the same locality.

AGES AND SHELL MEASUREMENTS OF TWO LARGE SPECIMENS OF MEGALONAIAS GIGANTEA (BARNES)

BY THOMAS K. CHAMBERLAIN,
U. S. Bureau of Fisheries Laboratories,
University of Missouri, Columbia, Mo.

During the past year the writer has had the opportunity to study two very large specimens of the Washboard, *Megalonaias gigantea* (Barnes). One of these mussels was collected by Lionel Goldfrank in the Ohio River, near Metropolis, Illinois, in 1902. The right valve of this specimen measured 218×138 mm. (8.58×5.43 inches) and weighed 688.5 grams (1.52 pounds). The thickness of the shell at the palial line was 20 mm. (0.79 inch). Similar measurements for the left valve could not be made, as button blanks had been cut from this valve and its posterior margin broken, but judging by the right valve the combined weight of the two valves must have exceeded 1350 grams, approximately 3 pounds.

The left valve of another specimen of the same species collected by T. K. C. in the spring of 1932 from the East Fork of White River, at Bono, Indiana, measured 209×146 mm. (8.23×5.75 inches) and was 16 mm. thick at the

palial line. The left valve weighed 565 grams, and the right valve 540 grams, giving a total weight of 1105 grams or approximately 2.5 pounds for the two valves.

Applying the annual ring method as described by Chamberlain (1932) the age of the Metropolis mussel at the time of its death was found to have been 54 years and the age of the Bono shell 36 years.

The measurements of these two specimens of *Megalonaias gigantea* compare very favorably with those of other large specimens of this species as listed in the existing literature. Simpson, p. 875 (1914), describes a specimen of this species measuring 210×113 mm. from the Little Miami River near Cincinnati, Ohio, and states that Lea's specimen was 8 inches long and weighed 2 pounds 9.5 ounces; Strode, p. 115 (1896), mentions another measuring 8.5 inches in length from the Spoon River, Illinois; and Marshall, p. 25 (1922), reports a specimen from Eagle Creek, Kentucky, measuring 216 mm. in length, the left valve of which weighed 723 grams. It is also evident that the age of the Washboard mussel may exceed 50 years.

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A NEW STAGNICOLA FROM MONTANA

BY FRANK C. BAKER AND JUNIUS HENDERSON

Stagnicola elrodi, new species.—Shell large, fusiform, rather thin, light to dark horn color; surface shining with well marked growth lines crossed by incised spiral lines; whorls 6½, well rounded with deep sutures; nuclear whorl

dark wine colored; body whorl large, convex; spire very acute, forming a well marked pyramid; aperture ovate in adult, elongate ovate in immature shells; outer lip thin, without variceal thickening; inner lip wide, flattened, emarginate, reflected over the umbilical region leaving only a very small umbilical chink; columellar axis with strong plait; color of aperture light brownish or pinkish.

Length 24.5 mm., diam 13.6 mm., aperture length 15 mm., diam. 7.8 mm. Holotype. Adult. Two immature paratypes measure: 18×9.5 mm., 10×5.1 mm., and 18×9.8 mm., 11.5×5.6 mm.

Type Locality: West shore Flathead Lake, 13½ miles north of Polson, Montana. *Types:* Museum Natural History, University of Illinois, No. Z33780; University of Colorado Museum, No. 19134.

The chief features distinguishing this species are its fusiform shape, long, acute spire with rounded whorls, wide aperture and body whorl, and the flattened, emarginate columellar lip with a well developed plait. It bears a striking resemblance to Currier's *Stagnicola intertexta*, a variety of *Stagnicola catascopium* living in Black Lake, Michigan, but the adult form of *elrodi* has a larger, more patulous aperture and the inner lip is more like that of *emarginata*, in which group it probably belongs. There is a slight resemblance, also, to the recently described Pleistocene fossil *Stagnicola couleensis* F. C. Baker, but in that species the spire is much shorter, more dome shaped, the aperture is smaller and the inner lip is not wide and emarginate. There is no Lymnaeid in the western states which closely resembles this species.

S. elrodi was at first thought to be a variation of *Stagnicola montana* (Elrod), an abundant species in McDonald and St. Mary's lakes, but in *S. montana* the shell is more elongated, larger, the spire whorls are very irregular, the penultimate whorl being larger and somewhat "puffy," the body whorl is smaller, narrower, and the aperture is smaller and rounder. The columellar region is different, the plait heavier, and there is a decided umbilical chink or umbilicus. The two forms appear to be quite distinct. *S. montana* is figured on plate 46, figs. 5-8 of the Lymnaeidae of Middle

and North America. The figure of *intertexta,* plate 40, fig. 35, of the same work somewhat resembles *elrodi.*

Two lots of this species were found in Flathead Lake, one the type lot, the other 16½ miles north of Polson. The latter consists of bleached specimens, almost like fossils in their appearance, the whorls a trifle more globose than in the type lot, but without doubt only local variations of *elrodi.* One specimen with a broken spire must have measured 29 or 30 mm. in length. Specimens 13-15 mm. in length, with 4½ whorls, found in McDonald Lake, are evidently the young of *S. montana* which occurs abundantly in this lake.

It appears probable that the fresh water pulmonates show the same tendency to vary in the lakes of the mountain regions of the western states that they do in the lake regions of the northern part of the United States and southern Canada. Each lake appears to have faunal characteristics different from those of nearby lakes and it would appear probable that some of the lakes have species confined only to one body of water. *Elrodi* is a species of this nature, evidently, since none have been seen from the other lakes in this vicinity. In the past most of the large Stagnicola-like Lymnaeids in the west have been referred to the all-embracing *palustris.* More systematic exploration such as the junior author is carrying on in the mountain region and more analytical studies of the material collected will doubtless add a number of species and races to the aquatic pulmonate fauna of the western states.

The species is named in honor of Professor Morton Elrod, of the University of Montana, who has studied the region of the Mission Mountains for many years.

A NEW SPECIES OF LYMNAEA FROM OREGON

BY JOSHUA L. BAILY, JR., AND RUTH INGERSOLL BAILY

LYMNAEA MAZAMAE, sp. nov. Plate 6, fig. 4.

Shell thin and brittle, elongated, the dimensions of the aperture being slightly greater than half those of the entire shell; periostracum corneous and chestnut colored, smooth and shining when fresh. but quickly becoming dull when dry, nearly always showing some degree of erosion, probably the result of carbonic acid in the water; nucleus of about one whorl obtusely rounded, and generally more eroded than the rest of the shell; body whorl large and flaring, frequently with very prominent malleations, and with lines of growth sloping backward from the suture; spiral whorls about 4 in number, rapidly increasing in size, and so inflated that they meet at the suture at an angle of approximately 120°; aperture large and flaring, rounded below and obtusely angled at the suture; outer lip sharp, thin, and regular; columellar lip white, completely covering the umbilical region, and so appressed as to form a continuous surface with the body whorl; columella twisted forming a distinct plait, most conspicuous when viewed in profile. Anatomy of soft parts not known.

Length 20	Breadth 12 mm.	Aperture 11 x 6 mm.
" 20	" 12 mm.	" 10.5 x 6 mm.
" 19	" 11 mm.	" 13 x 7 mm.
" 19	" 11 mm.	" 10.5 x 5.5 mm.

Type locality, Crater Lake, Oregon. Cotypes in the collections of the Academy of Natural Sciences in Philadelphia and the California Academy of Science in San Francisco.

This species bears a close resemblance to *L. mighelsi*, Binney, which F. C. Baker considers a variety of *L. emarginata* Say. In *L. mighelsi*, however, there is a distinct umbilical fissure beneath the reflected margin of the columellar lip, and the columella itself appears straight when viewed in profile.

Crater Lake, in southwestern Oregon, occupies the crater of an extinct volcano. The water is about seven thousand

feet above sea level, the crater rim about one thousand feet higher. The lake is about two thousand feet deep, and is fed entirely by melting snow. As the quantity of water so received is in excess of that lost by evaporation, the existence of a subterranean outlet is indicated.

The purity of the water is such that the configuration of the bottom can be plainly seen at a depth of about twenty feet, and its azure color has long made it a favorite with artists.

The quantity of lime in the water must be very minute, for the shells are thin and brittle and in many instances so completely eroded that large areas of the viscera are exposed. In fact, we saw a single specimen in which the shell had entirely disappeared.

The specific name given to this species is to commemorate Mt. Mazama, the volcano in whose crater it was found.

NOTES

SCIENTIFIC LITERATURE is now being produced far in advance of the facilities for publication by the societies and in the natural history journals of the country. We want to encourage everyone having interesting observations or important material to write them up, but we earnestly beg them to cultivate brevity. In descriptive articles we would suggest that a summary be substituted for long tables of measurements, and that locality records be presented as concisely as possible, without repetition of data. It is better for the author to do the condensing than to leave it to the editors.

LIBERA AGAIN.—On page 70 I mentioned my inability to find *Libera* in Paetel's "Catalog". Mr. H. C. Fulton has kindly called my attention to the entry: "Libera D Haan Gen. [gehört] zu Octopoda Leach." which appeared in another of Paetel's works, "Die bisher veröffentlichten Familien und Gattungsnamen der Mollusken" (1875), p. 109. This book contains an alphabetical list of names compiled without dis-

crimination and abounding in errors in the rank and equivalence of the names, as well as misspellings. Paetel was wrong in calling *Libera* a genus, as it was not proposed as generic, and of course it has nothing to do with the Octopoda. Such errors are common in the book; Dentale Lister is given as a genus; Dentaliidae H. and A. Ad. is also said to be a genus. So far as I can see, the presence of *Libera* in Paetel's list has no effect on nomenclature.—H. A. P.

THE EGGS OF GONIOBASIS VIRGINICA AND ANCULOSA CARINATA have been examined by Charles P. Winston (Journ. Wash. Acad. Sci., vol. 23, p. 34-36, figs. 1-4). There is a general agreement with those of *Goniobasis livescens* and of *Pleurocera.*

SELF FERTILIZATION AND NIDIFICATION IN PHYSA HALEI. —Recently an immature *Physa halei* Lea was introduced into an aquarium containing the viviparous tropical fish *Guppia.* On November 12 the glass sides of the jar were observed to have several of the characteristic egg capsules of *Physa* attached to them. A count gave 14 egg capsules ranging in size from 11 mm. to 18 mm. in length, and each capsule containing from 56 to 135 eggs in various conditions of development. In all, 1354 eggs were counted in the 14 capsules. The adult snail measured 15 mm. in length. All eggs were fertile and developing. The locality from which the *Physa* came is not definitely known but it was somewhere in southern Illinois. It was accidentally introduced into the aquarium. While all of the aquatic pulmonates are believed to occasionally reproduce by self-fertilization, actual recorded examples of this condition are rare in the literature.—FRANK C. BAKER.

VICTIMS OF what my old entomological friend Henry Skinner used to call the "mihi-itch" sometimes suffer curious complications of that malady. One of its distressing manifestations is the mania for renaming genera in groups the person knows nothing about, and would not recognize if he saw them. This is not really larceny, as custom has sanctioned the practice; one cannot avoid it in dealing with pre-

occupied names of past authors; but where the name in question was by a living author the courteous procedure is, as Dr. Stiles has pointed out, to inform the author of a homonym that he has used an inadmissible name, and allow him to make the necessary correction. A case of superfluous naming by an author not acquainted with the group is that of the genus *Alexandria* Tomlin, 1926 (a homonym of *Alexandria* Pfeffer, 1881). This was renamed *Alexania* E. Strand, 1928. Without assigning any reason the same author has again renamed the genus *Tomlinula* (E. Strand, Folia Zool. et Hydrob. IV, p. 193, 1932), not mentioning his own former name. It is a South African group referred to Acteonidae.—H. A. P.

Two Record Sizes of Pecten.—There are two pectens in my collection of West Coast shells that I believe are record sizes. The species are *Hinnites giganteus* Gray and *Pecten caurinus* Gould. The former often assumes rough and indefinite shapes somewhat as some oysters do; they seem to reach a ripe old age for a mollusk. The specimen at hand is a lower valve which was dredged in 1918 in the San Juan Islands from a rocky bottom. The upper valve was lost, although the animal was taken alive. This individual shows over 30 distinct presumably annual lines of growth in the region of the byssal plug furrow. It is covered with the usual commensal growths such as worm tubes, barnacles, bryozoa and boring sponges. The live shell has been perforated by several hundred pin holes of a boring sponge without apparent injury to the animal. The dimensions are as follows: Greatest length 222 mm. (8¾ inches); width 168 mm. (6½ inches); thickness of valve near byssal plug 64 mm. (2⅝ inches). Weight of lower valve 3 pounds 1 ounce.

The second shell *Pecten caurinus* Gould, was dredged outside of Wrangel Narrows, Alaska, in 1918. It is very thin and fragile for so large a shell. About ¼ inch of the lips of the valves were trimmed off but the present dimensions are as follows: Length 228 mm. (9 inches); width 198 mm. (7½ inches).

Six inches in considered quite a large size for this species. Dr. Marshall kindly showed me the largest specimen at the National Museum in 1927. It is in Dall's collection of Alaska shells and measures 6½ inches in length.—WALTER J. EYERDAM.

HAMINOEA VIRESCENS (Sowerby).—When I saw your note on *H. virescens* on p. 140 of the last NAUTILUS I went to our shell gallery and dug out the tablet in the Cuming collection referred to, labelled "Pitcairn's Island," 5 examples. I have compared them with series received from several Californian collectors as "*H. virescens*" (e.g., from Chace, Brown and Fred Baker), and I find them absolutely identical. Shape, size, and especially the extremely fine axial sculpture which gets more or less covered with transparent callus, tally exactly. If I can give you any further information towards settling the point, please command me; but I hardly think it is needed.—J. R. LEBROCTON TOMLIN, in letter to Editor.

THE THIRD ANNUAL MEETING OF THE AMERICAN MALACOLOGICAL UNION

That The American Malacological Union founded two years ago (1931) has become an established and recognized factor among students of malacology was evidenced by the splendid attendance at the Third Annual Meeting held in Cambridge, Massachusetts, Thursday, Friday and Saturday, May 25, 26 and 27.

From California, Colorado, Michigan and Florida, as well as from other states south and west, members were drawn to the malacological feast arranged by William J. Clench and the Boston Malacological Society ably represented by their secretary, Miss Theodora Willard.

The sessions were held at the Biological Institute of Harvard University to which Dr. Thomas Barbour welcomed the

delegates in a cordial address. The opening program Thursday afternoon comprised a historical sketch of the enormous collection of mollusca in the Museum of Comparative Zoology by William J. Clench, after which Dr. Paul Bartsch presented the presidential address, "Experimental Breeding of Cerions."

This was followed by "Studies of the Naiad Fauna of the Huron River, Michigan" illustrated with slides by Henry Vander Schalie. "Tertiary Arcidae of the Pacific Slope" by Philip W. Reinhart also illustrated with slides, and read by Mrs. Ida S. Oldroyd.

Thursday evening Dr. Bartsch spoke on "The Cruise of the 'Caroline'" showing a number of reels of film taken on the recent expedition to explore the Atlantic deeps. Tribute was paid to Mr. Johnson who made this exposition possible by donating his yacht for the service.

Friday morning the program included "The Systematic Position of the Genus Septifer Reclus" by Joshua L. Baily, Jr. "Esthetic and Economic Relations of Mollusks" by Junius Henderson. "The Varieties of Melongena corona" by H. A. Pilsbry. "The Peculiar Naiad Fauna of a Southern Michigan Lake" by Henry Vander Schalie. "Classification of Nuculid Pelecypods" by Hubert G. Schenck, read by Mrs. Oldroyd.

Friday afternoon concluded the papers which were as follows: "New Species of South American Pomacea" by William B. Marshall. "Notes on Some of the West Coast Veneridae" illustrated with slides, by Ida S. Oldroyd. "The Winter Habits of Certain Lake Dwelling Naiades" by Henry Vander Schalie. "Planorbidae of Florida" by Henry A. Pilsbry. "Mollusks of Monterey Bay" by MacKenzie Gordon, Jr.

A business session followed for the election of the Council resulting as follows: Junius Henderson, President; Ida S. Oldroyd, Vice President; Norman W. Lermond, Corresponding Secretary; Imogene C. Robertson, Financial Secretary.

Additional to officers: William J. Clench, Paul Bartsch, Calvin Goodrich, Henry A. Pilsbry.

The invitation from Stanford University to hold the meeting of 1934 in California was accepted.

An invitation from the Buffalo Society of Natural Sciences for 1935 was presented; also one from the San Diego Shell Club for 1938.

Mr. Robertson urged the formation of more local clubs as a strengthening of the Union and was later authorized to undertake an extension program of encouragement in this direction.

At the conclusion of the program members were invited to the home of Prof. and Mrs. Francis N. Balch in Jamaica Plain. Here refreshments were served on the lawn under splendid old trees. Of great interest was the exhibition of colored plates of nudibranchs, many of which were original paintings by Mrs. Balch.

Professor Balch's entertainment was concluded by a visit to the magnificent gardens of Mr. and Mrs. Lars Anderson who were cordial in their welcome to the visitors by whom the privilege of an inspection of the grounds was much appreciated.

The annual dinner was held on Friday evening at the Hotel Continental in Cambridge.

At this time Dr. Pilsbry spoke feelingly of the members lost by death during the year—Charles Torrey Simpson, Victor Sterki, Charles W. Johnson and Tom Oldroyd. At the conclusion of his remarks Dr. Bartsch asked that members rise and pay silent tribute with bowed heads to these departed friends.

Speeches, "wise and otherwise," enlivened this last evening together.

Professor Henderson presented a resolution of thanks which was adopted unanimously to be sent to all who have helped to make this meeting so enjoyable: To Harvard University and the Museum of Comparative Zoology for the use of rooms and other facilities necessary to the success of the meeting; to William J. Clench and his assistants, Miss Theodora Willard and other members of the local committee for the excellent arrangements for the comfort and enjoyment of visiting

members and the orderly presentation of the program; to Professor and Mrs. Francis N. Balch for the courteous opening of their home and grounds to those attending the convention; to Mr. and Mrs. Lars Anderson for the rare privilege of viewing their beautiful estate and the wonderful collection of trees and flowers; all of which courtesies have contributed to the success of the convention and the enjoyment of all attending members.

Saturday afternoon brought the three days meetings to a close with a field trip to Little Nahant Beach. Here hunting shells on the beach and social intercourse served to cement more firmly the bonds of friendship formed on these occasions.

IMOGENE C. ROBERTSON.

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AT THE HEAD OF THE GULF OF CALIFORNIA

BY HERBERT N. LOWE

The upper end of the Gulf of California had long been practically a *terra incognita* to the majority of the Conchologists collecting in the Gulf. Discouraging reports on the terrible condition of the roads did not deter us from making a try at San Felipe, one hundred and thirty-five miles below the international boundary and the only settlement in the upper reaches of the Gulf.

On May 6 of this year my friend, Mr. E. H. ("Pat") Quayle of the University of California, L.A., and I took our two cars, with camp equipment, extra gasoline and drinking water, and set out over the desert south of Mexicali. For about thirty miles we traversed an irrigated country similar to the Imperial Valley and then out in the open desert for twenty-seven miles to El Mayor on the Hardy river. On the ninety mile stretch from there to San Felipe, not a drop of water is to be found according to a road sign.

Some distance below here "El Desierto de los Chinos" (named from a grim desert tragedy of long ago) extends for forty miles or more. It is a vast stretch of Colorado River silt, level as a floor, but so impregnated with salt as to render it unfit for cultivation. When dry it is easily traveled but utterly impassable in the wet season when the high water from the Gulf overflows the whole country. El Desierto in its entire length boasts not the slightest vestige of vegetation.

About midway, alongside a well of salt water, is seen the

old condenser used by the long abandoned Pinta mine to furnish drinkable water.

Every few miles along the trail over these interminable mud flats are seen the skeletons of wrecked automobiles stranded in the mud, mute reminders of the unfortunate experience of some luckless travelers. As they stand there in the fierce blistering heat they are almost as startling as the bleaching bones of some ox train along the old overland trail of the forty-niners. For long distances the road is merely a pair of ruts so deep that only a truck could negotiate the high centers. From the southern end of El Desierto stretch mile on mile of white desert sand with a sparse growth of ocatilla and creosote bush.

Our first camp was at "El Aroyo de las Almejas" or in common English "Clam Gulch," about ten miles north of San Felipe. The sand flats at a spring tide are uncovered for a good mile from shore. We had good collecting at the three A. M. tide, and again in the afternoon. *Chione fluctifraga* Val. and *Paphia grata* Sby. may be taken here by the sack, which gives the name to the place On some of the sand bars at lowest tide an occasional *Lingula palmeri* was found.

The settlement of San Felipe, which literally lies at the end of the trail, is a heterogeneous collection of Yaqui Indian fishermen's shacks made from ocatilla stalks placed in the sand for sides, and roofs constructed of discarded gasoline tins and pasteboard cartons. Back of the village in the sand hills is a shallow well which furnishes the only drinking water in the vicinity.

On the tide flats in front of our camp, a few days before our arrival had been discovered a small bed of *Panopea globosa* Dall, and El Chino and Jesus Maria Carramba had rival claims staked out at the diggings. They are very delicious either as a chowder or fried. As the shells are very thin and live at considerable depth in the soft sandy mud, we were able to secure only three perfect pairs, even at a reward of a peso each.

At the time of our visit the full moon tides had a range

of eighteen to twenty feet which uncovered vast stretches of sand bars. On the rocky point to the north, three tidal zones could easily be drawn: zone one, covered a short time twice each day at high tide, inhabited by Littorinas, *Acmaea mesoleuca* Mke; *Acanthina angelica* Oldroyd; *Tegula rugosa* A. Ads.; rock oysters, etc. In zone two, uncovered twice each day at low tide, among the small stones could be dug *Semele flavescens* Gld. and the rare *Semele guaymasensis* Pils. and Lowe. *Fusinus cinereus* Rve., *Tegula californica* A. Ads., *Marginella californica* Tomlin; four species of *Anachis* and on the sand bars *Oliva incrassata* Sol., *Olivella zanoeta* Duch., *O. gracilis* and *O. anazora*, *Polynices reclusiana* Petit, *Solen rosaceus* Cpr. *Oliva incrassata* were very abundant at this time, and about one in fifty showed a yellow tinge; a single golden yellow specimen was taken.

Zone three is uncovered only for a short time at the lowest of the spring tides. Many of the rocks were covered with a rank growth of coarse yellow sponge; on this we took some *Cerithiopsis assimillata;* on the sides of the rocks where the sponge left off, we found a fine species of *Calliostoma,* an occasional *Crassispira nymphaea* Pils. and Lowe; large *Chama buddiana* C. B. Ads. (with their usual resident population of small species), and on the sand flats an occasional *Calliostoma palmeri* Dall, *Crassispira aterrima* Sby., *Chione purpurissata* Dall, *Cardium procerum* Sby., *Cardium elatum* Sby., *Pitar concinna, Mactra, Periploma pleniuscula* Sby.

Below zone three, at the end of the rocky point, in four or five feet of water at lowest tide, were taken a red and a white gorgonian, each with different species of *Ovula.* The *Acanthina angelica* seems to be a very active species for their slime trails give an appearance of veinings in the rocks.

We returned with a good representative collection of the mollusks of this region, besides many species of barnacles, crustacea, echinoderms and corals to repay us for our ten-day expedition.

STUDIES ON SNAILS OF THE GENUS PLEUROCERA
II. THE YOUNG OF P. ACUTA[1]

BY HARLEY J. VAN CLEAVE

For several years the writer has been conducting a field study of *Pleurocera acuta* in the Sangamon River about three miles northeast of Mahomet, Illinois. Population samples have been taken regularly in the hope that analysis of periodic samples might lead to an interpretation of the life history. In the course of this study the eggs were discovered and the egg laying habits were described in the initial article in this series of notes.[2] In the routine method of population sampling employed to date, the smallest individuals retained by the nets and graded screens were 5.7 mm. in length and 2.5 mm. in diameter. Following the discovery of the eggs it became apparent that newly hatched young were not being secured by the apparatus used in taking the population samples. Individuals under 7 mm. in length were so infrequently represented in the samples secured by washing sand, mud, and gravel as to suggest the possibility that the very young snails occupy a habitat distinct from that chosen by older snails. Attention was therefore directed to the securing of observations on the newly hatched young.

On June 3, 1933, numerous egg masses, identical in all respects with those of *P. acuta* secured under laboratory conditions, were discovered on stones in the bed of the river at the field station mentioned above. Stones containing these masses were removed to the laboratory for observation. The sand-encrusted egg masses were badly obscured by vegetation covering the stones. A number of the masses were removed from the stones and placed in a watch glass. Within each mass the embryos were in approximately the same state of development though in different masses the conditions varied from late veligers to shellbearing young.

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[1] Contributions from the Zoological Laboratory of the University of Illinois, No. 442.

[2] See NAUTILUS, Vol. 46, No. 1, pp. 29-34.

About twelve hours after the eggs were placed under observation, two very minute snails were found crawling actively over the bottom of the dish. These were studied alive and were later preserved for further study. The shell of the newly-hatched *P. acuta* has but a single whorl, with a maximum diameter of 0.4 mm. Because of the minuteness and fragility of the shell, measurements of the length were not obtained.

One of the two specimens kept under observation had the region of the aperture damaged, though the other possessed the prominently rhomboidal aperture distinctive of members of this genus. The shell in the region of the aperture carried very fine spiral sculpturing with a few fine longitudinally directed growth lines crossing the spiral markings. Except for shape of the aperture, the young of *P. acuta* closely resembles the young of *Goniobasis livescens* which Mrs. Jewell described and figured (NAUTILUS, Vol. 64, page 115). In this study the possibility of confusion is eliminated by the fact that Goniobasis does not occur in the Sangamon River and *P. acuta* is the only species of Pleurocera which is present in the upper waters of this stream.

The egg laying season apparently extends over several months, since eggs have been taken in the field in April and in June. No information about the length of the embryonic period is available. It seems probable that the 6 mm. young, representing the smallest size group present in the routine population samples, were probably hatched in May or June and thus were about seven months old. After hatching these shells had increased in diameter from 0.4 mm. to 2.5 mm.

The difficulty of recognizing minute shells barely visible to the naked eye, occurring in sand and in masses of algae, explains why the young of Pleurocera have not been recorded previously. The writer is not acquainted with any method of isolating and concentrating shells of such minute size from muddy detritus and sand.

NERITINA VIRGINEA IN TOWN CREEK AT MONTEGO BAY, JAMAICA, B. W. I.

BY E. A. ANDREWS

Montego Bay is a growing town of some thousands of inhabitants; in the west part is a very large spring covered by an old, ornate brick pillar with iron railings about the water exit; from this the large stream runs straight to the sea about a quarter of a mile between stone retaining walls, bounded on the west by a street and on the east by private properties, houses, the city mule-and-cart yard, and the large churchyard. The stream is about 20 feet wide with water one to three feet deep and considerable current. Two or three bridges cross it; the one nearest the sea lets pass the main road from east to west of the island with all the traffic; it receives surface drainage. The spring serves as water supply for washing, and in 1910 a covered wash-house near it ran its suds back into the stream; this has disappeared. Originally the spring was a large supply of drinking water but the city now has its own piped water.

The water front is not public, but walled or fenced off as private yards for the few large merchants whose grounds and buildings serve to accumulate logwood, sugar, etc., till date of shipment. The stream enters the sea or harbour between two such properties and its mouth is isolated except by passage through one of these yards, closed at night.

In July, 1910, in a flat bottom skiff we ascended the stream to near the spring and found bottom and side walls covered with countless small, 13-13½ mm. dark *Neritina virginea* with very many egg capsules, 3,005 *N. virginea* and 90 *N. punctulata,* small, and 37 *Neritilia succinea,* dwarf, were collected.

In 1932, not one *Neritina* could be found; natives said they used to be plentiful; one boy found just one dead shell jammed in at the spring. Men at work cleaning out one to two feet of sand from stream bottom could find no shells. In 1931, there was a cloudburst and some houses were swept away and floors inundated.

The boy who found one dead shell knew of some small shells at the mouth of the creek. These proved (July 6 and 8) to be as follows: on the west the wall at the mouth had been washed under so as to fall over backwards at a considerable angle. On this concrete slope, at the water's edge, were many very small dark snails variously blotched with yellow or white, with white apex and operculum, said to go up and down with the tides. Snails stand along 20 ft., a few to each square inch, as a scattered linear crowd. The tides are small and the harbour so protected that but a few inches pulse of ocean swell is visible at mouth of creek, leaving snails now 2 inches deep, now exposed to air. The fresh but dirty water runs out over the salt, and one can see it as a layer beneath which in the salt water corals still live with fresh water as their sky. Collected 212 nerites, strongly adherent.

Low down on the inclined cement grows a filamentous green alga, *Entomorpha erecta* (Lyng.) J. G. Agardh, and lower down small red algal tufts, and the snails were amongst this at times but at other times they crawled up on bare, apparently sterile, cement, going up and down with the tide and remaining only covered by a few inches of the fresh outflowing stream of water.

Density measurements showed a difference between surface and below as follows (to be corrected for temperature) July 8; at noon at surface.

Air	Water	Density	Air	Water	Density
	29.9 C.	1.013		29.8 C.	1.132
	29.6	1.018	30.4° C.	29.0	1.020
30° C.	29.0	1.022	30°	29.8	1.0136

Ten inches below surface the densities were: 1.023, 1.0235, 1.0202, 1.023.

Are these snails remnants of the *N. virginea* formerly so abundant?

REPORT ON A COLONY OF HAMINOEA AT BALLAST POINT, SAN DIEGO, CALIFORNIA

BY V. D. P. SPICER

On the May 12 field trip of the recently formed San Diego Shell Club a colony of Haminoea was found on Ballast Point, San Diego Bay. When I reached home and compared the specimens I had taken with the Haminoea which I had, I found them distinctly different from any in my collection. I immediately consulted with Dr. Fred Baker, who has been the Dean of San Diego shell collectors for many years, and found no similar shells in his collection. It is proposed to call this form *Haminoea virescens* var. *rosacea*.

Sunday, June 11, 1933, with a minus 1.1 ft. tide offered the first opportunity to establish the limits of the colony and determine the ecological features.

The colony occupies a limited area on the leeward or bay side of Ballast Point, at the entrance to San Diego Bay. It extends about three hundred feet along the shore and from about six-tenths feet above mean low water to beyond minus one and eight-tenths feet. The marginal boundaries are sharply delineated; the inner limit being established by a mud flat area with scattered stones, the outer by the spot where the strong ebb tide currents impinge. This area is very sheltered, the only disturbance being caused by the waves of passing vessels. The bottom is of small round stones, approximately six to twelve inches in diameter and everywhere closely overgrown with *Aletes squamigerus* and sea weed. The water carries a considerable amount of suspended mud. The Haminoea were quite abundant throughout the area. The only other molluscs occuring in quantities within the boundaries of the colony were *Murex festivus* and *Conus californicus*.

For comparison I chose a colony of typical *Haminoea virescens* with which I was familiar. This typical colony is on the seaward side of Point Loma in a series of shallow tide pools in the sandstone, which at high tide are beneath heavy surf. I secured my specimens at a plus 3.0 ft. tide

and at plus 2.0 ft. the pools are nearly all completely separated from the sea. The other mollusca abundant there were *Nuttallina californica* and among the rocks which margined the pools, *Tegula funebralis, Acmaea patina* and *scabra.*

No other colonies of Haminoea could be located in the areas adjacent to Ballast Point, even where similar environmental conditions seemed to prevail.

On June 11, 1933, fifty specimens were taken for study. Though no selection was made they were found to be very uniform in size, ranging from eighteen to twenty-two mm. length of shell. They were kept alive in a large shallow pan of sea water. Showing no alarm, they explored the limits of the container, deposited three clutches of eggs, and copulated during a forenoon's observation. They showed distinct phototropism, clustering at the side nearest the strong light used for their observation, and when the light was moved the regrouping near its new position was soon apparent.

The eggs were extruded from the right side in a gelatinous ribbon about five-sixteenths inch wide and an inch long. The eggs appear as minute yellow dots in close-set rows across the ribbon, about forty-two thousand in a set. As the ribbon of eggs touched the bottom it adhered and remained standing on edge as the mollusc wandered away. The adhesion was found to be quite strong even before the egg depositing was completed. The total time required to deposit a set of eggs was about ten minutes.

For comparison a number of typical *Haminoea virescens* (Sowb.) from Point Loma were added to the pan. There was no difficulty in separating the Point Loma Haminoea from the Ballast Point specimens as they were all much smaller, the shells showed a greenish color, and though the markings of the body were similar, the Point Loma molluscs were distinctly darker.

HAMINOEA VIRESCENS, variety ROSACEA.—Shell thin, transparent, globose, pale rose in color, color slightly deeper about the upper extremity. Aperture dilated and showing

only moderately the constriction about the upper third which characterizes the typical form. Sculpture consists of closely set sinuous incremental lines which appear slightly granose under a strong glass. Epidermis thin, corneous. Otherwise the description of the typical *H. virescens* applies. Altitude 21 mm. greatest diameter 14 mm.

Animal a mottled brown closely flecked with white, the markings of the body within showing through the shell. Eyes very dark blue. When fully extended the body length was 42 mm., the greatest width 22 mm., width of head 19 mm.

Type in my collection. Paratypes No. 161206 A. N. S. Phila. and in Dr. Fred Baker's collection.

PTEROPODA FROM LOUISIANA

BY MARTIN D. BURKENROAD

During an exploration of Louisiana coastal waters, from 1929 to 1931, nine species of euthecosomatous pteropods and one undetermined larval gymnosome were taken. The local and seasonal distribution of these forms was as follows:

None were taken in the brackish estuarine area inside the shoreline proper of the Gulf. *Creseis conica* (Eschscholtz) alone appeared sporadically in the shallow, variably brackish to fairly salt inner littoral waters extending fifteen or twenty miles offshore from the Gulf beach. These records are based on year-round towings. The remaining forms were taken on the two occasions when a penetration of the outer, more oceanic littoral area was feasible, in August, 1930, and in May, 1931. The limited material available from the former occasion contains several specimens of *Creseis acicula* (Rang) and *Cavolinia longirostris* (Lesueur). The series of tows from the latter contains all the species listed, with the exception of *Creseis acicula*. Both collections are from the same area: thirty-five to forty miles off Grand Isle and about thirty miles W.S.W. of the Southwest Pass of the Mississippi River, in the westward flowing

countercurrent to the east-flowing Gulf Stream which becomes perceptible further south and east. The gently sloping sea-bottom is here at a depth of a few hundred feet.

The pteropod fauna of the Gulf of Mexico has been the subject of little record except in the region of the Florida Keys. Three of the Louisiana pteropods *Creseis acicula, C. conica,* and *Hyalocylis striata* (Rang) are not listed from the Gulf by Meisenheimer, 1911, in his discussion of distribution.

SPIRATELLIDAE

Spiratella trochiformis (d'Orbigny).
S. bulimoides (d'Orbigny).

CAVOLINIIDAE

Creseis virgula virgula (Rang).
C. v. conica (Eschscholtz).
C. acicula acicula (Rang).
Hyalocylis striata (Rang).
Cavolinia longirostris (Lesueur).
C. uncinata (Rang).
C. inflexa inflexa (Lesueur).

The nomenclature of Tesch, 1913, and Thiele, 1931, has been followed.

A note on certain of the species may be added:

"*Limacina lesueuri* variety" of Vayssiere, 1915, seems close to or identical with *Spiratella trochiformis* as here determined. The identification by Bonnevie, 1913, of *S. trochiformis* with *S. retroversa* (Fleming), from the latter of which she distinguishes *S. balea* (Moller) seems not to resolve the confusion involving this group of forms. The *S. retroversa* group of snails as defined by Tesch have the columella arched to right rather than to left as in *S. trochiformis,* an operculum of quite different outline, and a tentacular lobe on the fin which is absent in *S. trochiformis.* These differences are not discussed by Bonnevie in her definition of *S. retroversa.*

The material here determined as *S. bulimoides* possesses very fine, closely spaced spiral lines of punctures on the

shell, while Tesch and Vayssiere describe the species as unsculptured. In other characters the Louisiana specimens are identical with the descriptions, and distinct, especially in operculum, umbilicus, and absence of tentacular lobes on the fin, from the *S. retroversa* group with which they might be confused. The species was much less abundant than *S. trochiformis.*

A single specimen of the form variably considered as a distinct species or as the typical variety of *C. virgula* was taken together with numerous *C. conica,* none of which latter showed any variation in the direction of *C. virgula.*

A number of young stages of a *Cavolinia* were taken which appear attributable only to *C. uncinata,* the larvae of which have not been previously reported.

The material examined has been deposited in the collections of the American Museum of Natural History and of the United States National Museum, to the authorities of which institutions the writer wishes to express his thanks for the facilities made available.

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NEW VARIETIES OF MELONGENA AND GYRINEUM

BY HORACE G. RICHARDS

While identifying the mollusk collection of Mrs. E. R. Edgerly, of Trenton, N. J., last winter, I noted two shells that appear to be distinct.

MELONGENA CORONA INSPINATA, n. var. Plate 6, fig. 1.

Similar to the typical *M. corona* Gmelin except that the spines on the edges of the square shoulders are entirely absent; no traces of knobs are present in the place of the spines. A few (six in the type, eight in the paratype) subbasal spines are present.

Type, length 10.1 cm.; width 6.2 cm.

Paratype, length 7.4 cm.; width 4.6 cm.

Type in the collection of Mrs. E. R. Edgerly, of Trenton, N. J.; collected by J. R. Holmes from the Gulf of Mexico near Sarasota, Florida. *Paratype* in the Academy of Natural Sciences of Philadelphia (cat. no. 160997); collected by C. B. Lungren from Palma Sola, Florida. A similar specimen is in the United States National Museum, Washington, D. C., from Sarasota, Florida.

GYRINEUM PERCA EDGERLYI, n. var. Plate 6, fig. 2.

Similar to the typical *G. perca* Perry except that the wing-like projections of the shell are more rounded and the spines less pronounced. A few small spines of the type specimen have been broken. Length 6.6 cm.; width 3.7 cm.

Type in the collection of Mrs. E. R. Edgerly, of Trenton, N. J.; locality, Japan.

A NEW ENDODONTA FROM THE HAWAIIAN ISLANDS

BY T. D. A. COCKERELL

On July 16, 1924, I found several specimens of an *Endodonta* in a dead tree-fern on Mt. Tantalus, Oahu. Submitting them to Dr. C. Montague Cooke, I was surprised to learn that they represented a new species. I divided my material with Dr. Cooke, who intended to describe the species. Recently I have received a letter from him, advising me to do this, as he is fully occupied with other matters.

ENDODONTA (THAUMATODON) COOKEI, n. sp.

Shell 2.2 mm. diameter, alt. about 1 mm.; the wide umbilicus with a diameter of about 0.6 mm. Color nearly white, suffused with reddish, with only very faint traces of flammulate markings. Whorls 4¾, convex, the periphery broadly rounded, the aperture rather narrow, not very oblique; sutures incised; surface with strong riblets, about 65 on last whorl and 53 on penultimate. Apex smooth. Two very strong, acute parietal lamellae, a rounded obtuse, quite large basal lamella, and four blunt short plicae on outer wall, rather remote from the aperture. The uppermost outer tooth is above the level of the first parietal, the second stands between the parietals, the third a little lower than the second parietal, and the fourth is rather crowded between the one above and the basal lamella.

This has much resemblance to *E. derbesiana* Crosse, from New Caledonia, and, indeed, it agrees well enough with Hedley's description of his Australian genus *Rhophodon*.

Type 158823, Philadelphia Academy Nat. Sci. Others still in my hands and with Dr. Cooke.

A NEW FORM OF POLYGYRA TRIDENTATA FROM ILLINOIS

BY FRANK C. BAKER

POLYGYRA TRIDENTATA FRISONI, new var.

Shell about the size of typical *tridentata* but differing in the position of the upper lip denticle which is placed lower on the lip, near the base, giving a distinct "dished" appear-

ance to the aperture; the parietal denticle is large and massive, very long, pointed at the upper lip denticle and extending downward to meet the reflected lip near the umbilicus. Sculpture and umbilical region as in typical *tridentata*.

Height 7.7; greater diam. 15.5; lesser diam. 13.6 mm. Holotype.

Height 7.5; greater diam. 15.5; lesser diam. 13.0 mm. Paratype.

Height 7.0; greater diam. 14.5; lesser diam. 12.2 mm. Paratype.

Height 7.0; greater diam. 14.0; lesser diam. 12.0 mm. Paratype.

Type locality: South end Fountain Bluff, Jackson Co., Illinois. Holotype, Z34983, paratype Z34982, Museum of Natural History, University of Illinois; paratypes, Acad. Nat. Sci. Phil., No. 161146.

This form of *tridentata* is related to both the *juxtidens* of the eastern states and the *discoidea* of the Ohio River. It is flatter, the sculpture is not as coarse, the umbilicus is wider and the lip denticles are differently placed in comparison with *juxtidens*, which it greatly resembles in the position of the parietal denticle. It is most nearly related to *discoidea*, but has a narrower umbilicus besides being much smaller. It replaces *discoidea* in the Ohio valley in Illinois and extends up the Mississippi Valley as far north as Randolph County. *P. t. discoidea* occurs at Mt. Vernon, Posey Co., Indiana, but none have been seen from Illinois. Specimens from the Ohio Valley in Illinois are larger than those from the Mississippi Valley. The variety is named for Dr. Theodore H. Frison, Chief of the Natural History Survey of Illinois.

NOTES ON THE LAND SNAIL FAMILY TORNATELLINIDAE

BY HENRY A. PILSBRY AND C. MONTAGUE COOKE, JR.

The classification of the family Tornatellinidae as understood by us in 1915[1] has been materially altered by the ex-

[1] Tornatellinidae, by H. A. P. and C. M. C., Manual of Conchology, vol. 23.

cellent work of Nils Hj. Odhner on the snails of Juan Fernandez.[2] The genus *Tornatellina* was based on a species of that island, the relationship of which with Polynesian and Hawaiian forms was hypothetical when we wrote. Odhner has shown that Juan Fernandez forms differ at least generically from the ordinary Pacific tornatellinid snails, and so widely from *Auriculella* that he advocates the removal of that Hawaiian genus and its allies to a separate family, Auriculellidae.

He has further shown that the genus *Fernandezia* Pils., which we had put in the Amastridae, in the absence of any anatomical information, is really closely related to *Tornatellina,* and undoubtedly a member of the Tornatellinidae.

The restriction of *Tornatellina* to the Juan Fernandez group leaves the generic allocation of the mid-Pacific species unsettled. The senior name for any Polynesian form is *Strobilus* Anton, 1839, based upon a very peculiar species of the island of Rapa. It is anatomically unknown, but as nothing much like it has been found elsewhere we consider it best to let *Strobilus* stand as a monotypic genus. The first valid name based on a tornatellinid of the ordinary Pacific type is LAMELLIDEA Pils., 1910, type *"Pupa" peponum* Gld. This covers forms not generically distinguishable, conchologically, from *Pacificella variabilis* Odhner, of Easter Island. Indeed, we consider this species an introduction in Easter Island, doubtless brought by the Polynesians, as we have found shells completely identical with those of Easter Island in several Polynesian localities.[3] The

[2] The Natural History of Juan Fernandez and Easter Island, 3, Zoology, 1922.

[3] The synonymy of *Lamellidea variabilis* (Odhner) is as follows.

Pacificella variabilis Odhner, 1922, Nat. Hist. Juan Fernandez and Easter Island, vol. 3, pt. 2, p. 249, pl. 8, figs. 15-17.

Tornatellina impressa normalis Pils. and Cooke, in part, specimens from Palmyra Island only, Man. Conch., vol. 23, p. 175.

This species is somewhat widely distributed, probably carried with food plants by the Polynesians; but its original habitat was doubtless in Polynesia proper, not in such outlying islands as Palmyra or Easter. We possessed this form when preparing our monograph, but at that time confused it with *T. impressa normalis,* which subsequent study with a series of all ages has shown to be a form of *T. pusilla* (Gld.), and belonging to *Lamellidea proper,* while *variabilis* from Easter and Palmyra belongs to the section *Tornatellinops.*

genus *Lamellidea* will include species No. 2 to 46 described in our monograph of 1915, pp. 140 to 186.

A provisional but very probable addition to the Tornatellinidae is the genus PITYS Moerch,[4] containing the single species *P. pagodiformis* (E. A. Sm.) of the island of Rapa. This has been associated by all former authors with the Endodontidae; but on going over Rapa shells in the British Museum last year one of us (C.M.C.) noticed that the apertural armature is tornatellinid in character. Specimens in the collection of the Academy in Philadelphia which we studied together confirm this observation, and we can add that no endodontid snail at all resembles it. Pending an examination of the anatomy we do not hesitate to place *Pitys* in the Tornatellinidae.

The solution of another enigma of the Pacific was found in the course of investigation of Polynesian snails at the British Museum. The genus *Tornatelloides* with the species *achatinoides* (Pfr.) was said on Cuming's authority to be from the Gambier Islands. There are three specimens, in the Museum, presumably the types, as the original label reads "*Strobilus achatinoides.* Gambier I. M.[useum] C.[uming]." They had been relabelled "*Ferussacia eremiophila* Bgt., loc.?" (probably by E. A. Smith). There can hardly be any question that these are the types, as Pfeiffer stated that his description was based on specimens in the Cuming collection. *Tornatelloides* will therefore become a synonym of *Ferussacia*, its type being very close to, or identical with, the Algerian *F. eremiophila* Bgt. Pilsbry's surmise is thus verified (Man. Conch. 23:191).

In the Marquesas Islands at elevations of 2,500 feet up, tornatellinid snails which appear to form a new subgenus were collected by Mr. A. M. Adamson and Dr. E. P. Mumford of the Pacific Entomological Survey.

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[4] The synonymy of *Pitys* is as follows.

Pitys "Bk." Moerch, 1852, Catal. Conchyl. Yoldi, 1, p. 6, for *Helix bilamellata* Pfr., not Sowerby=*pagodiformis* E. A. Smith. (? *Pitys* Beck, 1837, Index Moll. p. 9, for *P. oparana;* both nude names.)

Diaglyptus Pils., Man. Conch., vol. 8, p. 86; not *Diaglypta* Foerst.

Diglyptus Pils., ibid., vol. 9, p. 22, new name for *Diaglyptus.*

Atea, new subgenus of *Lamellidea*. Shell slender, turrite, of numerous (7 to 9) slowly increasing whorls, the apertural armature as in *Tornatellinops*. Type *L. adamsoni*.

Lamellidea adamsoni, n. sp. The shell is slender, pale brown, somewhat transparent, glossy, of 9 convex whorls, the apex acute; smooth, with some irregularly spaced growth marks. Aperture narrowly oblong, the parietal lamella large, columella thickened, sinuous, bearing a small, somewhat receding, steeply oblique lamella; outer lip thin. Length 7.2, diam. 2.4 mm. Hakahetau, Uapou. Cotypes 108448 Bishop Mus. and 161691 A.N.S.P.

Lamellidea mumfordi, n. sp. Similar but smaller, of 7½ less convex whorls, the apex rather obtuse, striation more developed, especially below the suture. Aperture wider. Length 5.2, diam. 1.9 mm.; length 4.7, diam. 1.75 mm. Ponaohumu, Hivaoa. Cotypes 94877 B.M. and 161692 A.N.S.P.

Lamellidea uahukana, n. sp. Shell more slender, of 7 to 7½ moderately convex whorls, which are finely *costulate* below the suture. Apex somewhat obtuse. Length 4.5, diam. 1.45 mm.; length 4.4 mm, diam. 1.4 mm. Hane, Uahuka. Cotypes 161693 A.N.S.P. and 104972 B.M.

These species will be figured in a supplement to the monograph of Tornatellinidae now in preparation.

THREE PREOCCUPIED NAMES IN THE PECTINIDAE

BY LEO GEORGE HERTLEIN

1. PECTEN WALUENSIS, new name for *P. thomasi* Mansfield, not Sowerby.

A pecten from the late Miocene or early Pliocene of the Fiji Islands was described as *Pecten thomasi* by Mansfield (Papers Dept. Marine Biol. Carnegie Inst. Washington, Vol. 23, Publ. No. 344, 1926, p. 90, pl. 5, figs. 1a and 1b. "Type locality, Walu Bay, Fiji Islands." Near Suva, Viti Levu, Fiji Islands.).

There is an earlier *Pecten thomasi* described by G. B. Sowerby (Proc. Malacol. Soc. London, Vol. 2, No. 4, 1897, p. 138, pl. 11, fig. 2. The type locality was unknown. The species it was stated, resembles *P. natans* Philippi.). According to Melvill and Sykes (Proc. Malacol. Soc. London,

Vol. 3, No. 1, 1898, p. 46) *P. thomasi* Sowerby appears to be the adult form of the species described as *P. corneus* Sowerby and *P. natans* Philippi. The species from the Fiji Islands described by Mansfield, can take the name *Pecten waluensis,* from the type locality.

2. PECTEN (CHLAMYS) SUTERI, new name for *P. radiatus* Hutton, not Gmelin or Bosc.

Hutton (Catalogue New Zealand Marine Moll., 1873, p. 82, Stewart's Island, 13 fathoms) used the name *Pecten radiatus* for a New Zealand species. According to Bavay (Bull. Mus. d'Hist. Nat., Vol. 15, 1909, p. 278) *Ostrea radiata* Gmelin (in Linn. Syst. Nat. Ed. 13, Vol. 1, 1790, p. 3320) is a pecten and can be referred to *Pecten opercularis* Linnaeus. There is also a prior *Pecten radiatus* Bosc (Hist. Nat. Coq., s. à. Deterville, Ed. Buffon, Moll., Vol. 2, 1801, p. 264. "On ignore son pays natal." A reference is given to Gaultieri, Test. tab. 74, fig. G.). The name *Pecten* (*Chalmys*) *suteri* is therefore proposed for the New Zealand species to which Hutton applied the name *radiatus.*

Iredale (Trans. N. Z. Inst., Vol. 47, 1915, p. 486) mentioned that the name is preoccupied but chose to retain the name *radiatus* by considering *Chlamys* as a genus. The combination *Pecten radiatus* having been used, it seems best to follow the International rules of Nomenclature in this case and consider Hutton's later usage as untenable. (See International Rules of Nomenclature, Article 36, in Proc. Biol. Soc. Washington, Vol. 39, 1926, p. 87.) Even if *Chlamys* were considered as having the status of a genus, Hutton's specific name would be preoccupied, because the species described by Gmelin and Bosc, both fall under the classification of *Chlamys.*

3. PECTEN VAUN, var. WYTHEI, new name for *Pecten vaun,* var. *flabellum* Cooke, not Gmelin, Bosc, nor Defrance.

The name *Pecten flabellum* has been used for a species named by Gmelin, and it has also been used by Bosc and by Defrance. The variety named *flabellum* by Cooke can therefore take the name *Pecten wythei* in honor of Dr. C. Wythe Cooke of the U. S. Geological Survey.

The Cuban form originally described as *flabellum* by Cooke will apparently take the following synonymy:

Pecten vaughani, var. *flabellum* Cooke, Carnegie Inst. Washington, Publ. 291, 1919, p. 134, pl. 8, figs. 6a, 6b, 7. "La Cruz and Santiago, Cuba." "Oligocene."

Pecten vaun, var. *flabellum* Cooke, NAUTILUS, Vol. 34, No. 4, April, 1921, p. 137. "La Cruz marl (middle Miocene), La Cruz and Santiago, Cuba."

[?] *Chlamys* (*Aequipecten*), sp. cf. *C.* (*A.*) *flabellum* (Cooke), Woodring, Geol. Republic of Haiti, Repub. Haiti, Dept. Publ. Works, 1924, p. 156. Port de-Paix, Tortue Island. Upper Oligocene.

Pecten kunkumana, var. *flabellum* Cooke, Maury, Bull. Amer. Paleo., Vol. 10 (Bull. 42), 1925, p. 241 (Bull. p. 89). "La Cruz and Santiago, Cuba." [*P. kunkumana* Maury, 1925, is an exact synonym of *P. vaun* Cooke 1921=*P. vaughani* Cooke, 1919, not *P. vaughani* Arnold, 1906.]

Not *Ostrea flabellum* Gmelin, in Linn. Syst. Nat. Ed. 13, 1790, pp. 3320, 3321. [=*Pecten flabellum.*] According to Bavay (Jour. de Conch., Vol. 58, No. 4, 1911, p. 319) this is *P. gibbus* of Lamarck, not *P. gibbus* Linnaeus. Bavay also considered that "*P. Tissotii* Bernardi=*P. flabellum* Gmelin, *juvensis.*" According to Dall (NAUTILUS, Vol. 38, No. 4, 1925, p. 113), *Ostrea flabellum* Gmelin is a synonym of *P. gibbus* Linnaeus.

Not *Pecten flabellum* Bosc, Hist. Nat. Coq., s. à. Deterville, Ed. Buffon, Moll., Vol. 2, 1801, p. 266. "On ignore son pays natal." A reference is given to Regenfuss, Conch. 1, tab. 9, fig. 33.

Not *Pecten flabellum* Defrance, Dict. Sci. Nat., Vol. 38, 1825, p. 265. [According to Sherborn.]

ON THE SYNONYMY AND DISTRIBUTION OF PLANORBIS ANATINUS ORBIGNY

BY CARLOS GUILLERMO AGUAYO

While studying the Planorbidae of Cuba for a paper in preparation on the fresh water mollusks from that Island, the writer has found it necessary to synonymize as *Drepanotrema anatinum* (Orb.) several of the described species belonging to this genus hitherto considered as different

forms, a fact that shows the wide distribution of this Neotropical planorb. Believing the following notes may prove useful to those interested in West Indian freshwater shells, I am publishing them at Dr. Pilsbry's suggestion, in advance of the above mentioned paper.

I wish to thank Dr. Pilsbry for his help in checking some of the synonyms as well as for obtaining Major M. Connolly's comparison of Cuban *P. esperanzensis* with the type lot of *P. anatinus*.

Drepanotrema anatinum (Orbigny)

Planorbis anatinus Orb., 1835, Mag. de Zool., Vol. 2, Cl. 5, No. 62, p. 28 (Rio Paraná, Argentina); 1837, Voyage dans l'Amérique Méridionale, Vol. 5 (3), Moll., p. 351, pl. 45, f. 17-20; Clessin, 1885, Syst. Conch. Cab., Vol. 17, p. 70, pl. 15, f. 5 (Brasilien, Inseln des Panama bei Bajada).

Drepanotrema anatinum H. B. Baker, 1930, Occ. Pap. Mus. Zool. Univ. Mich., No. 210, p. 51 (Bejuma, Venezuela).

Planorbis haldemani C. B. Adams, 1849, Contr. to Conch., p. 43 (Jamaica); Shuttleworth, 1854, Mitth. der Naturf. Ges. Bern, p. 97, (Pto. Rico); Crosse, 1892, Journ. de Conch., Vol. 42, p. 36 (Pto. Rico); E. A. Smith, 1895, Pr. Malac. Soc. London, Vol. 1, p. 320, pl. 21, f. 22 (Trinidad); E. A. Smith, 1896, Journ. de Conch., Vol. 8, p. 245 (Trinidad); Dall & Simpson, Bull. U. S. Fish. Com., Vol. 1, p. 370 (Pto. Rico).

Planorbis esperanzensis Tryon, 1866, Amer. Journ. of Conch., Vol. 2, p. 10, pl. 2, f. 11-13 (Esperanza, Cuba); Arango, Contr. Fauna Malac. Cuba, p. 278 (Plantatione Ingenio Esperanza, Pinar del Rio, Cuba); Crosse, 1890, Journ. de Conch., Vol. 42, p. 261 (Plantation Esperanza, Pinar del Rio, Cuba).

? *Planorbis isabel* Morelet, in H. and A. Adams, 1858, Gen. Moll., Vol. 2, p. 264 (nom. nud.).

Planorbis isabel "Morelet" Sowerby, 1879, Conch. Icon., Vol. 20, gen. *Planorbis*, pl. 12m, f. 101 *a-b*, sp. 101 (Mus. Brit.); H. B. Baker, 1923, Occ. Pap. Mus. Zool. Univ. Mich., No. 135, p. 2 (Laguna de Catemaco, southern Vera Cruz, Mexico).

Planorbis yzabalensis Crosse et Fischer, 1879, Journ. de Conch., Vol. 27, p. 342 (lake Yzabal and river Usumasinta, Guatemala); Clessin, 1885, Conch. Cab., Band. 1, Vol. 17, p. 217 (Guatemala et Mexico); Fischer and Crosse, 1894,

Miss. Scient. Mex., part. 7, Vol. 2, p. 75, pl. 33, f. 2-2c (Tabasco, Mexico; Izabal and Usumasinta, Guatemala). Von Martens, 1899, Biol. Centr. Amer., Mollusca, p. 397 (Guatemala and Mexico).

? *Planorbis aracasensis* Gundlach, 1857, Malak. Bl., 4, p. 179 (Aracas, Trinidad, Cuba), (*sine desc.*); Arango, 1880, Fauna Malac. Cuba, p. 136 (Trinidad, Cuba), *sine desc.;* Crosse, 1890, Journ. de Conch., Vol. 42, p. 260 (Lagunes de Trinidad), *sine desc.*

Planorbis aracacensis "Gundl" Clessin, 1884, Conch. Cab., Band 1, Vol. 17, p. 143, pl. 15, f. 7 (Plantacion Esperanza, Pinar del Rio, Cuba).

Planorbis involutus "Dunker" Clessin, *loc. cit.* (as synonym of *Pl. aracacensis*).

Description.—The following is the original description of *Pl. anatinus* Orbigny. "Testa discoidea, globoso-compressa, tenui, laevigata, lucida, cornea, superne subtusque convexa, centro solum perforata; umbilicata, ad peripheriam rotunda; quatuor anfractibus, spiris cunctis amplexantibus; apertura compressissima, arcuata, obliqua, semi-lunari. Alt. 1 millim., amp. 2 millim. Habit. ripis Paraná (Republica Argentina)."

The type locality was not well specified in the original description, but later on (1835 ?, Voyage dans l'Amérique Méridionale, Moll. p. 351), Orbigny remarked: "Nous avons recontré cette espèce dans l'estomac des canards que nous avons tués sur les îles mêmes du Rio Paraná, un peu au dessous de la ville de la Bajada, capitale de la province d'Entre Rios. Nous l'avons recherchée dans les mêmes lieux; et, après beaucoup de peine, nous l'avons recontrée au sein des lacs du centre des îles, parmi les plantes aquatiques. Elle paraît y être rare."

Remarks.—A study of the type lots of *P. haldemani* Adams and *P. esperanzensis* Tryon, now in the Academy of Natural Sciences of Philadelphia, shows the complete identity of both species. The last has also the spiral punctures described by Adams for *haldemani,* though more or less obsolete in some specimens, as found likewise in Adams species.

Dr. H. B. Baker, who has studied some Planorbis from

Venezuela identified as *P. anatinus,* considered them identical with the above-mentioned species. For this reason, cotypes of *P. esperanzensis* were sent to Major Connolly of London, with the request that he compare them with the cotypes of *P. anatinus* in the British Museum. Major Connolly kindly sent the following information: "I have carefully compared your examples of *Plan. esperanzensis* Tryon with the remains of the type set of *Plan. anatinus* Orb. and find them *absolutely* identical, except that the latter are infinitesimally less mature; there is no use entering into details, because there is no difference whatsoever between the two species."

The *Pl. aracacensis* "Gundl" Clessin, described from the sugar Plantation "Esperanza," Pinar del Rio, Cuba (also the type locality for *P. esperanzensis*) shows by its description, figures and type locality its identity with the last species.

It seems convenient to remark here that the lots of *Pl. aracasensis* Gundl. ms., which I have seen in several collections, belong to two different species: Some specimens (U. S. National Museum), from Trinidad, Cuba, are unquestionably *D. anatinum* Orb., but other sets, also from Trinidad, Cuba (Academy of Natural Sciences of Philadelphia and American Museum of Natural History), belong to an entirely different species of the genus *Planorbula,* which is near *Planorbis arakanensis* "Gould" Sowerby (Reeve, Conch. Icon., Vol. 20, *Planorbis,* pl. 12, f. 100. a, b, sp. 100), from Trinidad. I am convinced that the name used by Sowerby was the result of an unfortunate threefold mistake in copying a label of *P. aracasensis* Gundl., from Trinidad, Cuba.

Planorbis isabel "Morelet" Sowerby (misspelling for Yzabal), shows by its figures and description its similarity to *P. anatinus* Orb. It was considered by Clessin (*op. cit.* p. 143) as a synonym of *P. aracacensis,* though erroneously giving priority to his species, which was described five years later. Clessin remarked also its similarity to *P. anatinus.*

The identity of *P. yzabalensis* Crosse and Fischer, de-

scribed from Morelet material, with *P. isabel* "Morelet" Sowerby has been suggested by von Martens, 1899 (*loc. cit.*)

Localities.—In addition to the localities mentioned in the synonymic references given above, the following records may prove useful:

Cuba: Rio Guaso, Guantánamo, Ramsden coll. (Ac. Nat. Sci. Phila.); Marianao, Habana, S. N. Rhoads coll. (Ac. Nat. Sci. Phila.).

Haiti: Rio Guayubin, Sabaneta, Santo Domingo, Olsson coll. (Ac. Nat. Sci. Phila.); Lake Miragoane, Haiti, Eyerdam coll. (Mus. of Comp. Zool. Harvard).

Panama: Gamboa, Canal Zone, Zetek coll. (Ac. Nat. Sci. Phila.).

Brazil: Pará, Dr. Fred Baker coll. (Ac. Nat. Sci. Phila.).

This species seems to be the most widely spread planorbid of the Americas, as its range of distribution so far known covers Argentina, Venezuela, northeastern Brazil, Panama, Guatemala, Mexico, Cuba, Jamaica, Haiti, Porto Rico and Trinidad. It has been found very frequently associated with *Drepanotrema lucidum* Pfr., and may sometimes have been confused with young specimens of that species. It is therefore quite possible that *D. anatinum* will be found within the whole area of distribution of *D. lucidum.*

A NEW COLOR FORM OF LIGUUS FROM A NEW AREA OF THE FLORIDA EVERGLADES

BY MIZPAH OTTO DE BOE

LIGUUS FASCIATUS SOLISOCCASUS, nov. subsp. Pl. 6, figs. 5, 6.

Shell: Small, thin, elongate, polished. Whorls 6½ to 7½, slightly convex. Columella thin, very slightly twisted, and in a few specimens slightly truncated. In the holotype the columella is perfectly straight. Palatal lip emarginate. Parietal wall thinly calloused. Sutures moderately well impressed. Sculpture of the shell consists of very narrow growth lines. *Coloration:* Ground color ochraceous yellow

to pale ivory. There is always a subsutural band of very dark brown and a supra and infra peripheral band of the same color. These bands are usually broken up into squarish blotches. They continue in a more or less broken series on the fifth, fourth, and third whorls becoming paler brown towards the top. Beginning at the basal area there is always a series of brown, purplish, or bluish streaks radiating upward on the basal whorl, running through the subsutural, supra and infra peripheral bands, breaking them into the squarish blotches mentioned above. This creates a pattern of alternating yellow and darker rays. In these characters it differs radically from *Liguus fasciatus clenchi.* There is always a reddish peripheral band which shows faintly on the palest shells. The holotype and some of the paratypes have eight distinct green lines on the basal whorl. Traces of these lines will be found on all shells with but few exceptions. Tip is pale, fleshy pink. The columella itself may be white but there is a broad rich reddish purple area which in many of the shells also covers the columella. There is always a horny-brown basal band from 3.5 mm. to 4.5 mm. wide which is almost always over-run by the purple. In some specimens the ground color is covered by a distinct wash of smoky blue. These shells differ from *L. f. clenchi* in their decidedly striated appearance as distinct from the banded appearance of *clenchi.*

Length 40.4 mm., width 21 mm., aperture length 18.6 mm., width 12.5 mm.

Holotype: P. C. deB. coll. No. 876, Hammock No. CC 6, Collier County, central Everglades, Florida. In private collection of Dr. M. P. deBoe. Collector George R. Waldeck, January, 1933. Paratypes in collections of George R. Waldeck, Dr. M. P. deBoe, R. F. Deckert, and Acad. Nat. Sci. Phila., Pa., No. 161281.

Remarks: This is a new area from which Liguus has not been collected before. In the hammock "CC 6," 45 per cent. of the Liguus are of the *fasciatus* type (pink apex and columella), 55 per cent. are *crenatus* type. Sixteen per cent. of a large series taken are the new form described above.

MESOMPHIX (MICROMPHIX) SUBPLANUS PLANUS, SUBSP. NOV.

BY GILBERT S. BANKS

Pl. 7, figs. 5, 6, 7

Description: Shell about 18.5 mm. in maj. diam.; discoidal; very thin and translucent; surface shiny. Greenish horn color. Whorls, 6; quite flat above, but evenly rounded on the body-whorl. Spire, completely depressed. Suture slightly indented. Aperture expanding transversely, lunate; peristome simple. The sculpture consists of closely set microscopic radial ridges and very fine spiral lines, both of which extend, although fading, to the umbilicus. Umbilicus, narrow and deep; showing no whorls, and contained in the shell diam. from 9 to 12 times (the smaller number being for young shells).

Holotype: M.C.Z. No. 94334, G. S. Banks collector, Sept. 4-7, 1930. Paratypes, M.C.Z. Nos. 82573, and 86437; and in the collections of A F. Archer, and G. S. Banks.

Type Locality: Steps Gap, Mt. Mitchell, Yancey Co., North Carolina. The subspecies was also found in the Black Mts., between Pt. Lookout and Ridgecrest, N. C., at an altitude of about 3,000 ft.

Remarks: The main difference between *Mesomphix subplanus,* and *M. s. planus* are the discoidal appearance of *planus,* the transversely placed aperture (which is oblique in *subplanus*), and the conspicuous umbilicus (which is even more conspicuous in young specimens). The columella does not tend to cover over the umbilicus in adult specimens, as in *M. subplanus.*

To further illustrate the difference, I will compare the measurements of the holotype of *M. s. planus,* with a typical specimen (of the same size) of *M. subplanus* from New Found Gap, Great Smoky Mts.

M. subplanus, gr. diam. 18.0, less. diam. 15.9, alt. 8.9, width ap. 8.7; width last wh. at ap. 7.1 mm.

M. s. planus, gr. diam. 18.2, less. diam. 15.7, alt. 6.6 width ap. 8.5; width last wh. at ap. 6.0 mm.

Mesomphix s. planus seems to be confined to high elevations.

SURINAMIA, A NEW AMPULLARIID FROM DUTCH GUIANA

BY WILLIAM J. CLENCH

SURINAMIA, new subgenus of ASOLENE Orb.

Differs from *Asolene* proper by possessing strong spiral sculpture, being imperforate and having a very dark mahogany color, a color materially different from the usual greenish or greenish-yellow of most Ampullariidae. From the subgenus *Pomella* it differs in its color, in its type of sculpture, and lacks the peculiar neritoid aperture of this latter subgenus. *Pomella* has a rough and somewhat malleated surface, not however, similar to the usual smooth malleations in *Pomacea*, but slightly elongated and oblique sculptural depressions. Genotype, *Asolene* (*Surinamia*) *fairchildi*.

ASOLENE (SURINAMIA) FAIRCHILDI, species nov. Plate 7, figs. 1, 2.

Description: Shell rounded, solid, imperforate. Color more or less uniformly mahogany brown. No trace of banding. Interior of aperture brown, orange-brown to grayish. Color usually more intense just within the lip, lighter just below, and then much darker well within the aperture. Columella light brownish orange. Whorls convex, probably 3 or 4 (all specimens corroded). Spire depressed. Palatal lip simple. Parietal wall rather heavily calloused and with a slight additional thickening at the insertion of the lip on the body whorl. Aperture rounded-ovate, entire palatal area somewhat flaring. Face of the aperture cast at an angle of 70° from the horizontal line. Outer edge of lip somewhat sigmoid in a profile view. Columella heavy, arched smoothly into the parietal area. Sculpture of numerous, generally fine spiral incised lines, cut at right angles to the finer, more irregular and less sharply ridged growth lines. Under an eight power lens (Pl. 7, fig. 2) there appears a series of very fine, spiral wrinkles, most numerous on the superior portion of the body whorl. Suture well depressed but not indented. Operculum unknown.

Measurements: Holotype, height 49, with 44.5, aperture 41 x 28.5 mm. Average measurements of five specimens: height 48.9, width 46, aperture 41.2 x 26.8 mm. (loss of 5-7 mm. in height through corrosion of spires).

Holotype: M.C.Z. No. 80515. On rocks in the cataract of the Surinam River below Kedjo, Dutch Guiana (100 miles up river from Paramaribo), David Fairchild collector, March 3, 1932. Additional paratypes, M.C.Z. No. 80516; Acad. Nat. Sci. Phila., and the University of Michigan.

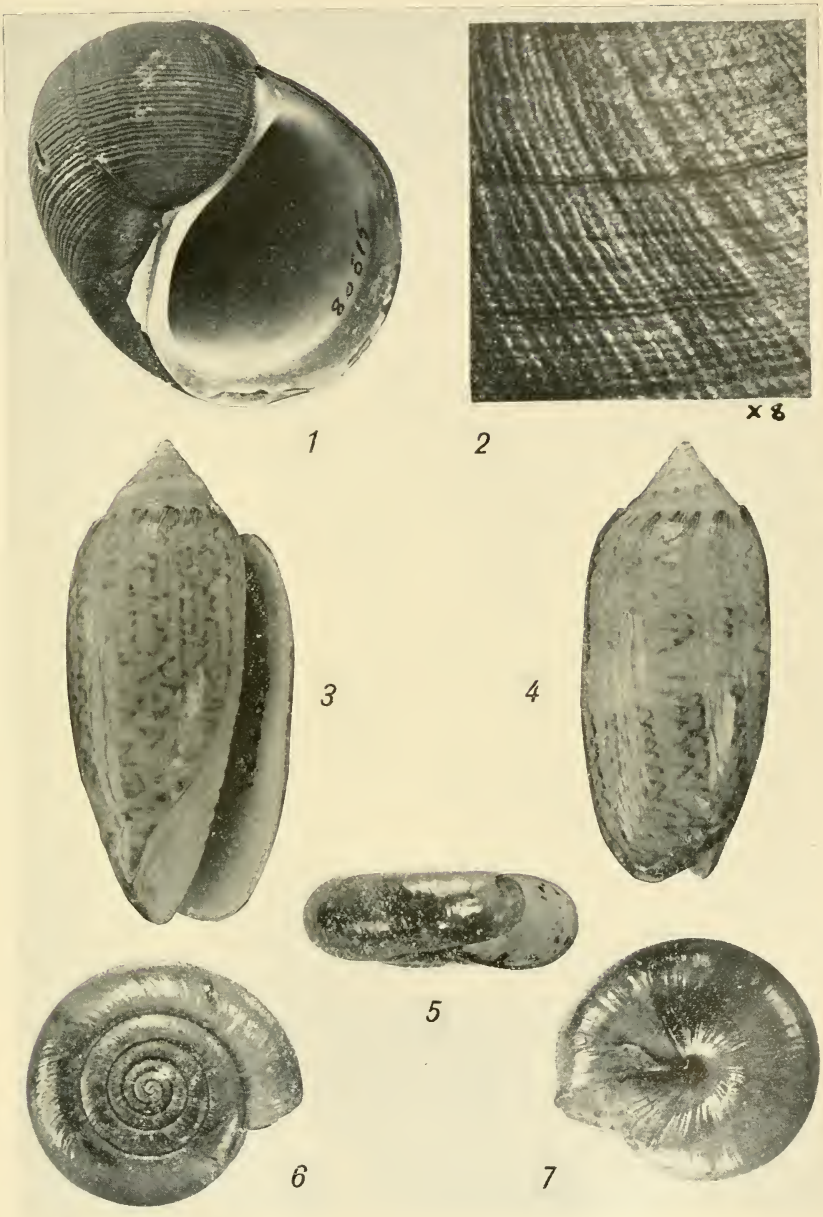
Remarks: Surinamia is provisionally placed in the genus *Asolene* until more definite knowledge relative to its soft parts is known. *Asolene* is without a breathing siphon, the lack of which is the main differential generic character from other Ampullariids. If *Surinamia* is found to possess such a siphon, its taxonomic position would then not be in *Asolene* but in *Pomacea,* and probably near to the subgenus *Limnopomus.* A recent paper by Pilsbry (Proc. Acad. Nat. Sci. Phila., 1933, 85, p. 74-75), summarizes our knowledge of *Asolene* and lists all of the known forms. This is the first record of any member of this genus north of the Rio de la Plata drainage.

THE PEDAL PROTRACTOR MUSCLE SCAR IN SHELLS OF NAIADES

BY WILLIAM B. MARSHALL
United States National Museum

One object of these notes is to call attention to the fact that the relation of the position of the protractor scar to the position of the anterior adductor scar is of more importance than is generally known.

Lea, in his description of *"Unio" quadrans,* stated that it came from Texas, is nearly allied to *berlandierii,* and has the anterior cicatrices confluent. Simpson (1900) expressed doubt that the shell came from Texas and thought that it was a South American shell allied perhaps to *Diplodon apprimus, D. uruguayensis,* and possibly to Hupé's *"Unio" orbignyi.* He classified it as a *Diplodon,* making it the only member of the group of *D. quadrans.* In dealing with this species (1914) he made the following statement: "This shell, which is in the Wheatley collection [now No.



1, 2. Asolene (Surinamia) fairchildi Clench.
5, 6, 7. Mesomphix subplanus planus Banks.

125601 A.N.S.P.], is supposed to have come from Texas. Nothing like it has been reported by any one else from that State, and there seems to be nothing from the Texan or Mexican region that is in any way related to it. The umbonal region is so eroded that no traces of beak sculpture remain, but the character of the teeth, the general appearance, color and sculpture seem to ally it to the forms of South America."

In both 1900 and 1914, Simpson in his definition of the group of *Diplodon quadrans* stated that the anterior cicatrices are confluent, but as shown in his remarks quoted above, he did not use this character to differentiate the shell from the naiads of Texas and Mexico. Recently I had occasion to determine, if possible, whether *quadrans* really came from Texas as stated by Lea, or is a South American shell as believed by Simpson. At first it seemed that it was closely related to *Lampsilis berlandierii,* as indicated by Lea, and by a little stretch of characters it appeared to almost fit that species. But the confluence of the protractor scar with the anterior adductor scar, did not agree with any Texan naiad, and upon comparing the character of these scars in *Diplodon* with those in the North American naiads it became apparent at once that *quadrans* did not come from North America but probably from South America, as supposed by Simpson. It is almost certain that this is the case. Nearly all the naiads which have cardinal and lateral teeth and which come from North America, or from nearly any part of the world except South America and the Australian region, have the protractor scar distinctly separated from the anterior adductor scar, and they are nearly always a considerable distance apart, or if near together, they are divided by a distinct barrier which keeps them separated. Every species of *Diplodon,* whether it comes from South America or from the Australian region, has the protractor scar confluent with the anterior adductor scar, and in the animal these two muscles evidently lie against each other. What part of the combined scar was formed by the protractor and what part was formed by the adductor is usu-

ally indicated in some way. As a rule, the surface of the protractor scar is a little elevated above that of the adductor scar. Sometimes they are on the same level, but a difference in looping of the growth lines of the two scars will point out which is which. Other times there is merely an optical difference showing where the two muscles lay in contact on the surface of the shell.

Haas (1930, p. 37) also considers *"Unio" quadrans* Lea a *Diplodon* and treats is as a synonym of *Diplodon fontainianus* Orbigny. He places also *"Unio" rufofuscus* Lea in the same synonymy. In this treatment of these three species, Haas has been as unfortunate as he was in his treatment of the synonymy of many other species, as for instance *Anodontites crispata* Bruguière in 1931. In the present instance all three of the guesses involved were incorrect. *U. fontainianus* is not the same as either of the other two species, and they are not the same as each other. *U. fontainianus* is a typical *Cyclomya* and has a very round shell. *U. quadrans* is not a *Cyclomya,* has a form which may be described as rhomboid or quadrate, and is probably related to *Diplodon apprimus* Lea, as suggested by Simpson. *U. rufofuscus* is a much smaller shell; it also is quadrate or rhomboid; its beaks are granosely radiately ornamented to such an extent that probably some of this ornamentation would show on *quadrans* if its beaks were similarly ornamented. Another difference between the two is that in *rufofuscus* the pallial line anteriorly terminates where the protractor scar joins the anterior adductor scar, while in *quadrans* it runs to the anterior side of the adductor scar. The differences between *fontainianus* and *rufofuscus* are self-revealing and need not be pointed out.

As in several other cases in which I have called attention to the value of apparently unimportant details, the remarks about the relative position of the protractor scar indicate that it, too, is of considerable importance.

In this connection it is interesting to note that Simpson did not give particular attention to the relation of the position of the two scars to each other. He did not use it as a

generic character in describing the genus *Diplodon,* and in his 18 subdivisions of the genus into subgenera, sections and groups the anterior cicatrices are mentioned in the descriptions of only four, thus: Group of *D. parallelopipedon:* "Anterior scars smooth, distinct." Group of *D. quadrans:* "Anterior cicatrices deep, confluent." Subgenus *Cyclomya:* "Two lower anterior scars deep, united." Subgenus *Laevirostris:* "Anterior muscle impressions small, well marked."

The statement regarding the scars of the group of *D. parallelopipedon* is not exactly accurate. Many specimens have the scars confluent and in those in which they are not distinctly confluent the barrier between them is not bold as in the North American naiades. While the scars of the group may be said to be somewhat aberrant, they have more the nature of confluent scars than of separate scars.

To his subgenus *Laevirostris* Simpson referred only one species, *"Unio" stagnorum* Dautzenberg. Pilsbry and Bequaert (1927, p. 404) transferred the species to the genus *Caelatura,* retaining the subgeneric name *Laevirostris.* Habitat and conchological features show that this classification is probably correct. Were it a *Diplodon* it would be the only African species. Dautzenberg in his description of *stagnorum* did not mention the protractor scars and they are not clear in his figures. Pilsbry and Bequaert, who had specimens of the species, say (1927, p. 405), "The anterior adductor scar is well impressed, the scar of the foot protractor small, separate."

Dr. Pilsbry has generously presented to the U. S. National Museum two specimens which show that they are undoubtedly *stagnorum* and that the scars are separated as stated, offering another evidence that the species is not a *Diplodon.* Were it a *Diplodon* the scars should be *confluent.* In all respects the scars in *stagnorum* are similar to those of other species of *Caelatura* and help to confirm the allocation of the subgenus *Laevirostris* to genus *Caelatura.*

References

1900 C. T. Simpson: Synopsis of the Naiades * * * (Proc. U. S. Nat. Mus. XXII, No. 1205).

1914 C. T. Simpson: A Descriptive Catalogue of the Naiades * * * *.
1927 Pilsbry & Bequaert: The Aquatic Mollusks of the Belgian Congo * * * * (Bull. Amer. Mus. Nat. Hist., vol. 53, art. 2, p. 404).
1931 F. Haas: Versuch einer kritischen Sichtung der Südamerikanischer Najaden * * * * (Senckenbergiana XIII, No. 1, p. 37; Ibid, No. 2, p. 92).

NOTES

Owing to the absence since June of Dr. Pilsbry in Hawaii and of Dr. Baker in Jamaica, the October issue of NAUTILUS has been delayed.

CORRECTION.—By a printer's error after the proof was read, the entry: HARBISON, ANNE, 151 W. Susquehanna Ave., Philadelphia, Pa., on page 42 of July NAUTILUS, was printed "Harrison."

OOTOMELLA, NEW NAME FOR OOTOMA Koperb.—In 1931 E. J. Koperberg described in the Jaarboek van het Mijnwezen in Nederlandsch Indie, on page 48, the genus *Ootoma* for two new species: *O. jonkeri* and *O. martini*, without designating a type. Unfortunately the generic name *Ootoma* Koperberg proves twice preoccupied:

1833. *Ootoma* P. Dejean, Catalogue des Coléoptères de la collection de M. C. Comte Dejean, ed. 3, p. 163.

1850. *Ootoma* E. Blanchard, Catalogue de la Collection Entomologique, Classe des Insectes, Ordre des Coléoptères, tome I, p. 120.

As the name *Ootomella* appears not to have been used, I now propose it for *Ootoma* Koperberg, with *Ootoma jonkeri* Koperberg as its type.—PAUL BARTSCH.

EUDAPHNELLA, a new generic name.—In the Proceedings of the United States National Museum, 1931, volume 79, article 15, page 3, I gave the name *Eudaphne* to a group of small Turritid mollusks, designating *Eudaphne allemani* Bartsch as type. My attention has been called to the fact that this name has been employed before for *Lepidoptera*

(*Eudaphne* [subgenus to Dryas C. & R. Felder] Reuss, 1922, Arch. Naturg., vol. 87A, No. 11, p. 221). It is for this reason that I now propose the use of *Eudaphnella*, with the same type, to replace my *Eudaphne*.—PAUL BARTSCH.

CORBICULA IN S. RHODESIA.—Apparently no *Corbicula* has been recorded from S. Rhodesia. On May 8, 1932, Miss Alice Mackie found a species of *Corbicula* common in the Ingezi River, Shangani, S. Rhodesia. A valve of *Unio* (*Cafferia*) *caffer* Kr. (somewhat corrugated but far less so than the variety *natalensis* Lea), and *Planorbis pfeifferi* Kr. were found at the same place. The smaller specimens of the *Corbicula* appear to agree well with *C. oliphantensis* Craven, P.Z.S., 1880, and with specimens from Burnup in Acad. Nat. Sci. Phila., from the Transvaal. The pinkish color of the umbones is conspicuous, and the radiating mark or marks of *C. radiata* (Phil.) are absent. Yet the shell grows to a larger size, length 18 mm., than Craven indicates, and varies in depth of color, so the distinction from *C. africana* Krauss may not be valid.—T. D. A. COCKERELL.

BRUGUIÈRE'S CONNECTION WITH THE NAME CORETUS.—As a rule I give no attention to ill-founded criticisms of my writings. I am making an exception in the case of a recent attempt (in Folia Zoologica et Hydrobiologica 4:113, 1932) to controvert my statement that *Coretus*, as used by Bruguière, has "no significance in nomenclature" (NAUTILUS, 44: 100). I take up this matter again because if *Coretus* were accepted as of the date of Bruguière (1789), as my critic contends, it would displace the name *Gyraulus*, everywhere in use for a nearly cosmopolitan genus of Planorbidae.

Under the article *Conchyliologie* in the "Encyclopédie Méthodique," Bruguière gave a historical review of conchological systems prior to his time, beginning with Lister, 1685. On p. 545-6 he gave a summary of the "Method de Adanson," 1757, in which *Coretus* appears with the rest of Adanson's names. In these reviews Bruguière collated the classification and names applied to shells by the various Pre-

Linnaean authors and down to Müller. He discusses each work in a general way, without expressing any opinion about the merits of individual names used. He nowhere adopted *Coretus*. Now, the International Commission on Nomenclature has considered such cases in Opinion 5 of the Code . "A Pre-Linnaean name ineligible because of its publication prior to 1758, does not become eligible simply by being cited, or reprinted with its original diagnosis, after 1757. To become eligible under the Code, such names must be reinforced by adoption or acceptance by the author publishing the reprint." *Coretus* and all the rest of Adanson's names, as well as those of Tornefort, Klein and others mentioned by Bruguière, come under this ruling. If one name is accepted, many others must be. This would entail wholesale changes in nomenclature. I believe that any malacologist who looks into the matter will agree with me that *Coretus* cannot properly be dated from Bruguière, and that the name *as used by him* has "no significance in nomenclature."

Whether anyone who seeks to mislead zoologists in such matters is a "pest" is, of course, a matter of opinion. However, I am willing to withdraw the offending epithet, for, after all, it may be argued that every man has a right to his own views on nomenclature. To disagree with the International Commission Code may be thought antisocial, but it is hardly unethical. As I remarked in another connection (NAUTILUS 30:109): "Science is democratic; fool, lunatic and savant have the same consideration in nomenclature."—H. A. P.

GYRAULUS VERMICULARIS ALBOLINEATUS, new subspecies. Plate 6, fig. 3. This form differs from typical *vermicularis* only in the presence of a number of white lines on the last whorl parallel with the growth lines On the type (largest) specimen there are eight of these lines. They suggest the sutures of an exfoliated specimen of a minute fossil nautiloid, but do not form partitions or apparently even internal calluses. The white lines are due to periodical changes in

pigmentation, not to accidental discoloration. The type measures 4 mm. in width. I obtained six specimens from the Weiser River at Starkey, Idaho, in 1930. They are in the University of Colorado Museum (No. 17475). It is interesting to note that a single specimen of *Lymnaea* (*Fossaria*) *obrussa* from the same locality exhibits the same characteristic.—JUNIUS HENDERSON.

SNAILS OF THE MARNOCK PLANTATION.—Among the effects of the late John K. Strecker was the manuscript of a paper, written in 1931, that described a visit to the old homestead of Gabriel Marnock in Bexar County, Texas. The paper is principally herpetological, and that part of it is to be published in *Copeia*. To save bibliographical confusion, it has seemed advisable to print here that which deals with shells. In connection with reptiles, amphibians, scorpions and centipedes, Strecker speaks of collecting "hundreds of snails including good series of *Holospira roemeri* Pfr. and *Microceramus texanus* Pilsbry," later writing: "Both days at least a third of our time was devoted to collecting snails, and in addition to the two species previously mentioned we obtained specimens of *Euglandina singleyana* W. G. Binney, *Helicina orbiculata* Say, *Bulimulus dealbatus mooreanus* W. G. Binney, *Praticolella berlandieriana* Moricand, *Polygyra mooreana* W. G. Binney, *Polygyra texasiana* Moricand, *Retinellla indentata* Say, and some small Pupidae. The Marnock hill is very rocky and in many places is covered by growths of cedar, scrubby deciduous trees and shrubs, Opuntias and other flora. A number of goats get most of their subsistence on its slope and summit, and it is surprising that it is still inhabited by so many species of small native animals." In the nearby Helotes Creek were taken *Planorbis lentus* Say and *P. liebmanii* Dunker.

THE THOMAS BLAND COLLECTION OF AMERICAN LAND SHELLS.—Mr. L. P. Gratacap published in 1901[1] a catalogue of the Binney and Bland collection which had come into the possession of the American Museum of Natural History in

1882. This catalogue lists the species, localities and number of specimens received. In the prefatory remarks several statements are made which would lead one to believe that the major collections of W. G. Binney and Thomas Bland, as well as the elder Amos Binney, had all been brought together to form this collection. I cannot say just what portion of the individual collection of W. G. Binney made up this composite collection, but the specimens supplied by T. Bland were apparently his duplicates and not his major collection at all. The Museum of Comparative Zoology purchased the entire collection of Bland's North American shells in 1868. The following extract is from the Annual Report of J. G. Anthony, Curator of Mollusks at that time[2]: "One of the most important additions made to our collection of mollusks during the past year has been by purchase from Mr. T. Bland of New York of his large and carefully labelled collection of North American Land Shells, the result of many years of patient labor on his part, and embracing 260 species and 2,494 specimens."

The above statement is set forth because Gratacap (loc. cit. p. 336) states that in addition to the material used by A. Binney, W. G. Binney and G. A. Gould in the preparation of their several papers, the collection also contained . . . . . "the cabinet of his life-long co-worker and friend Thomas Bland." It was apparently assumed by Gratacap that the entire collection of T. Bland was thus included and not only a selected series of duplicates as was actually the case.

The following is extracted from the notes in the catalogue of T. Bland, furnished with the collection now in the M. C. Z. "The collection was made between the years 1853 and 1868 inclusive . . . . The arrangement was intended to be, and is, so far as circumstances permit, the same as that adopted by Mr. W. G. Binney in the catalogue, of which he is the author, now being printed by the Smithsonian Institution. . . . . The red line under the name of the author of any species indicates that the specimens are authentic types. New York, October, 1868." (Signed) T. Bland.

This collection contains several lots and species not listed by Gratacap in the "Binney and Bland Collection," and in addition Bland's types as well as many of those of Binney, Cooper, Gould, Lea, and other contemporaries. These "types" are cotypes in modern usage and consequently several of our larger museums possess type lots from the original series.—W. J. CLENCH.

1 1901, Bull. Am. Mus. Nat. Hist., 14, pp. 335-403.
2 1869, Annual Rept., Mus. Comp. Zool., p. 20.

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WEST AMERICAN CHAMIDAE, PERIPLOMA AND GLYCYMERIS

BY HENRY A. PILSBRY AND HERBERT N. LOWE

Having recently reviewed the West American Chamidae in the collection of the Academy of Natural Sciences and the Lowe collection, we think that a list of the species we consider valid may be of interest. In place of bibliographic references we may mention here that Broderip's species were first fully described and illustrated in the Transactions of the Zoological Society of London, vol. I, 1835; afterward, with some changes, in Reeve's Conchologia Iconica, vol. IV, 1846-7, where Reeve also made some additions to the list.

1. CHAMA BUDDIANA C. B. Adams (Panama Cat. p. 253, 1852, Guaymas and Panama). A well marked species with irregular whitish subtubular spines on a reddish ground, the interior white. We have seen it from as far north as Concepcion Bay, Lower California. *"Chama ? frondosa* var. *fornicata"* of Carpenter's Mazatlan Catalogue was said by him in 1863 to be identical with *buddiana.*

2. CHAMA FRONDOSA Brod. Type loc., Isle of La Plata, W. Colombia. The typical form with broad, frond-like spines, as in Tr. Zool. Soc., pl. 38, fig. 1, and Reeve, fig. 1*a*, seems to be exceedingly rare northward; single specimens were taken by one of us at the Tres Marias, Cape St. Lucas and La Paz. Tryon (Proc. A. N. S. Phila., 1872, p. 117) placed *Chama purpurascens* Conrad as a synonym of *frondosa.* So far as we know, Conrad never described this form. His specimens, in the collection of the Academy, are the var. *mexicana* Cpr.

3. CHAMA FRONDOSA MEXICANA Cpr. (Mazatlan Cat., 1855, p. 87) is the var. *b* of Reeve, pl. 1, fig. 1*b*, described from the Gulf of Tehuantepec. This seems to be the common form along the west Mexican coast including the Gulf of California. It grows to huge proportions and is often riddled by boring mollusks and covered with marine growths until none of the original sculpture is visible. Carpenter's minute shells "from Chama and Spondylus washings" were doubtless from this species. Probably the unfigured *Chama parasitica* Rochebrune (Bull. Mus. Nat. Hist. Paris, I, 1895, p. 243) is this form. It was found on submerged branches of mangrove in the "Lagunes de l'ile San José."

4. CHAMA ECHINATA Brod. Type loc., Puerto Portrero, C. A. It is common along the Mexican coast, where the attached lower valves are often conspicuous by their purple interior and light coral red hinge, this bizarre color combination making even a worn valve easily recognizable. Reeve's pl. 7, fig. 35, is evidently a young shell with spines in perfect condition. His *Chama coralloides*, from the type locality of *echinata*, has been considered a worn specimen of this species.

5. CHAMA PELLUCIDA Sowb. (See Tr. Zool. Soc. I, p. 302, pl. 38, fig. 3). Type loc., Iquiqui, Peru; has been reported as far north as Oregon. Young specimens have sometimes been identified erroneously as *C. spinosa* Brod., a species which does not occur on the west American coast.

6. CHAMA SORDIDA Brod. Type dredged by Cuming in 18 fathoms at the Island of Cuña, Central America. The only specimens taken by the junior author were brought up by a tangle in 15 fathoms off Carmen Island, Gulf of California, with Spondylus and *Arca pacifica*. It is a very well marked species of uniform reddish color, with irregularly spaced stout spines.

7. CHAMA SQUAMULIGERA Pils. & Lowe. (Proc. A. N. S. Phila., 1932). Has been taken at San Juan del Sur, Nicaragua; Manzanillo, Mazatlan, Tres Marias and Cape St. Lucas. This small delicately spinose shell was formerly

often identified as *C. spinosa* Brod. by West Coast conchologists.

8. CHAMA VENOSA Reeve. Type loc. unknown. So far as we know, it has been taken only in Gulf of California. Our specimens were found on piling of an old wharf at Ensenada de los Muertos. According to Lamy a synonym of this species is *Chama digueti* Rochebrune, 1895, l. c. p. 243, which came from "Lagunes de l'ile San José," and is said to be related to *C. fibula* Rve. It has not been figured, measures 35 x 17 mm., and is striolate with brown and rose.

PSEUDOCHAMA Odhner.[1] These are the "inverse" chamas, attached by the right valve. It was formerly believed that the same species might be attached by either valve, with corresponding inversion of the hinge teeth analogous to dextral and sinistral gastropods; but according to Odhner, "no case of real inversity among the Lamellibranchs is known . . . . nothing but slight dislocations of the hinge elements."[2] *Chama* and *Pseudochama* are thought by Odhner to be descendants of sinistral and dextral stocks of *Diceras*, respectively.

PSEUDOCHAMA INERMIS (Dall.). (Amer. Journ. Conch., vol. 7, p. 148.) In the original description this shell is said to measure 3.1 x 2.1 inches. It is rugged, sinistral, obscurely three-sided; smooth except for the lines of growth, covered with a strong, light yellow epidermis. Interior white; margin smooth; the posterior edge of the left valve with a narrow band of purple, etc.

The junior author on examining the type (No. 24108 U. S. N. M.) when in Washington in October, was reminded of the Australian *Chamostrea*. The total absence of spines and the strong, wrinkled, buff epidermis is like no other Chama of our coast. The following note by Dr. Carpenter is in the tray: "I wrote a diagnosis of this queer shell as *Chama inermis*, but have suppressed it as it may be a queer

[1] Nils Hj. Odhner, "Studies . . of Recent Chamidae," in Kungl. Sv. Vet. Akad. Handl., Bd. 59, No. 3, p. 20. Type *Chama exogyra* Conr.

[2] Loc. cit. p. 8. See also in this connection: W. F. Popenoe and W. A. Findlay, "Transposed hinge structures in Lamellibranchs," in Trans. San Diego Soc. N. H., vol. 7, p. 301. 1933,

growth of something else. It is certainly not Puget Sound from the parasites, which are tropical. It is not unlike *C. iostoma* Conr., worn smooth."

Rev. J. Rowell presented the specimen, with the locality "Puget Sound." He went to California by way of Panama. Dall gave the locality "Central America," but he had no information save that given by Rowell and Carpenter. Though described over 60 years ago the species does not appear to have been collected again until 1930, when one of us (H. N. L.) found a specimen on Maria Madre Island of the Tres Marias group. This shell, figured in Plate 8, figs. 1-3, measures 47 x 67 mm., diam. 32 mm., being smaller than the type. The periostracum is from cream buff to cinnamon buff, with a wide crescentic streak of purple on the upper valve. The interior is white with olive-buff muscle scars. This is the first authentic habitat for one of the most distinct of all chamas, as the other localities assigned were mere guesses.

10. PSEUDOCHAMA CORRUGATA (Brod.). Type loc., Real Llejos. The only specimens taken were on rocks in Montijo Bay, R. P. It is readily recognized by the dark purple interior with white border.

11. PSEUDOCHAMA EXOGYRA (Conrad). Upper California (Journ. A. N. S. Phila., vol. 7, p. 256). Very common on the California coast, and reported as far south as Panama.

A closely allied but apparently distinct small species has been dredged in deep water by H. N. L. and others off Catalina Island. It will shortly be described by A. M. Strong.

12. PSEUDOCHAMA JANUS (Reeve). Galapagos Islands, Cuming. Known only from the type locality, where one of us took specimens at Seymour Bay, Indefatigable Island (Pinchot Exped.). The two patterns of sculpture on the upper valve (which suggested the name) make it easy to recognize, even in very dead specimens.

13. PSEUDOCHAMA PANAMENSIS (Reeve). Panama, Cuming. We have not seen this species, although both of us collected at Panama.

ECHINOCHAMA comprises a few nearly equivalve species

with small or transitory attachment, otherwise allied to *Pseudochama*.

14. ECHINOCHAMA CALIFORNICA Dall. Gulf of California. One of us dredged this in 20 fathoms off Manzanillo and off Acapulco, one specimen considerably larger than the type. It is a very rare form, seldom seen. This is the species reported from Panama as *Chama arcinella* L. (the common West Indian species), collected by the St. George Expedition.

Species reported in error from West America

Chama iostoma Conrad is a Hawaiian species.

Chama imbricata Brod. From "Lord Hood's Island"= Marutea, Tuamotu Group.

Chama spinosa Brod. Same locality. (=*C. asperella* Lam., a widely spread species of Australia, East Indies and Polynesia.)

Chama pacifica Brod. Lord Hood's Island=Marutea, Tuamotus.

Chama broderipi Rve. Same locality.

PERIPLOMA ALTA C. B. Adams

This Panamic species has been placed in the synonymy of *P. planiuscula* Sowb. by several authors, but it is really a distinct and valid species. It is much more closely related to *P. discus* Stearns, from which it differs by the larger size and the outline of the posterior end. The mistake arose from a typographical error in Adams' description, the "height 1.35 inch" should read 1.55 inch. The type specimen is a single left valve, still preserved in the Amherst collection, with Adams' autograph label.

Whether *P. lenticularis* Sowb. is specifically identical with *P. planiuscula* cannot be affirmed without an examination of the type, which has not been figured.

GLYCYMERIS DELESSERTI (Reeve)

This species, of which the locality was unknown to Reeve, was collected at Maria Madre, Tres Marias Islands, in excellent, typical specimens during the Lowe trip of 1929. It

is a handsome shell, related to *G. inaequalis* Sowb., but having many more primary ribs. It was reported as *G. assimilis* in Proc. A. N. S. Phila., 1932, p. 141. In *G. delesserti* the radial ribs are cut by deep radial grooves into little ridges, which are crenulated by concentric furrows, this being especially marked on the outer ridges of each rib. The spaces between ribs do not have radial grooves. In *G. inaequalis* the radial grooves are as well developed in the intervals as on the ribs.

SOME WESTERN FRESH WATER MOLLUSKS

BY JUNIUS HENDERSON

HELISOMA OCCIDENTALE (Cooper). Pl. 9, fig. 1. This species was briefly described by Cooper, without figure, in 1870. He designated no type and no type locality, but gave its range as from Washington to Kern Lake and San José, California. His description and measurements, with his statement that it has been called both *trivolvis* and *tenuis*, and his subsequent statement (1890) that "many intermediate forms now prove that it is only the mature form of *P. tumens*," indicate that he confused two very different forms; but anyone who has examined large collections of *Helisoma* from California can see how he should have been so confused. His material is said to have been destroyed. Hence it is desirable to select a neotype. A form which could have furnished the basis for his description is common at Klamath Lake, Oregon. He probably had specimens of *Helisoma* from there, as he mentioned other species of mollusks from that lake. I have selected as neotype a specimen from Klamath Lake, No. 17737-*a*, University of Colorado Museum, which I figure, together with two others in the same collection from the same place. The neotype measures 27.5 mm. in diameter and 15 mm. in altitude just back of the slightly everted lip, approximating Cooper's maximum measurements. The last whorl is not carinate,

but is shortly rounded above and more broadly below. These specimens are from a lot identified by Dr. Bryant Walker as *H. binneyi* and published by me under that name, which is clearly incorrect. Specimens from the same lake are in Stanford University collection, as well as from the eastern shore of Rhett (Tule) Lake in northeastern California and other localities. Though somewhat resembling *H. binneyi* (Tryon) in the strap-like whorls, *occidentalis* differs markedly in the less pronounced sculpture and the disappearance of the carina at an early stage of growth. Specimens from various western localities resemble this form except in the fact that the altitude is less in proportion to the width. Two such examples from Likely, South Pitt River, California, in the Stanford University collection, have many small indentations on the last whorl and sharp striae widely spaced, as represented by Binney, 1865, fig. 193, of a "form of *Pl. corpulentus*" from the West Coast, but they have not the characteristics of that species or its western analogue, *binneyi,* nor are they typically *occidentalis.* Cooper referred to that figure as "a form of" *occidentalis,* and Tryon, 1867, said it is a form of *ammon,* which is less likely.

HELISOMA BINNEYI (Tryon). Pl. 9, fig. 2. *Planorbis corpulentus* (Say) was described from Manitoba and Ontario in 1824. In 1844, Haldeman redescribed what he considered Say's species, under the same name, and figured a specimen from "Lewis River," taken by Nuttall. There is a Lewis River in southwestern Washington, which may be his locality, as Nuttall's route took him close to, if not on, that stream, but in his account of the plants collected on his trip he made frequent use of that name for the Snake River, Idaho and eastern Washington, as did also Townsend in his narrative. Nuttall does mention "arid plains of Upper California on Lewis River," but, though California was then an indefinite region, the boundary not having been definitely fixed at Lat. 42 N. until several years later, Nuttall's references show that he knew the territory later organized into Oregon, including Washington, by the name Oregon, not

California. I have seen no true *binneyi* or *corpulentus* from the Snake River, formerly called the Lewis. Again, in 1852, Gould described and figured what he took to be Say's *corpulentus* from Columbia River, Oregon, taken by Drayton of the Wilkes' Exploring Expedition. In 1865, Binney declared the West Coast form to be distinct, but did not suggest a name, and intimated that *corpulentus* is merely a form of *trivolvis*, which is erroneous. In 1867, Tryon named the West Coast form *binneyi*, without description or figures, but referred to Haldeman's and Gould's descriptions and figures, which is sufficient to validate the name, under the rules. Haldeman's Lewis River being uncertain and Gould's Columbia River very indefinite, there seems to be no real type locality known. F. C. Baker informs me that Gould's type is in the U. S. National Museum, No. 5530. Dr. Pilsbry writes that Haldeman's specimens from Lewis River, in the Academy of Natural Sciences of Philadelphia, No. 131581, measures 15 x 23 mm., and adds that "Haldeman's figure is good." The specimen figured herewith, from Whatcom Lake, Bellingham, Washington, in the University of Colorado Museum, No. 13989-*a*, middle figure, measures 23 mm. in diameter, altitude 14 mm. just back of the slightly everted lip.

HELISOMA TRASKII (Lea). Pl. 9, fig. 3. This species, described from Kern Lake, California, was declared to be "the most remarkable *Planorbis* yet observed in the United States," an inch and a half in diameter, 86/100 inch high, the growth striae "among the finest and closest of the various species." The proportions given, height about 57% of width, do not agree with the figure, which shows a shell proportionately much higher, but the measurements were based upon a specimen with part of the aperture broken away, and the figure does not correctly represent the type. The largest of three specimens from Kern Lake in the Academy of Natural Sciences of Philadelphia, received from Trask, measures 20 x 26.3 mm., "almost exactly the size of Lea's figure" (letter from Dr. Pilsbry). The type, U. S. National Museum, No. 121000, has part of the last

whorl, including the aperture, broken off, the remaining portion of the shell measuring one inch in diameter. "If complete, I think the shell would have the diameter given by Lea in his description" (letter from Wm. B. Marshall). The largest specimen I have seen, middle fig. 3, that may be assigned to this species, is from Stockton, California, in Stanford University collection, and measures only 26 mm. in greatest diameter, height 19 mm. at the aperture. The resemblance of this species to *binneyi* is notable, but it is more nearly barrel shaped, considerably higher proportionately, and the sculpture less pronounced, especially on the last whorl, where the striae are very fine, but just in front of the aperture they are coarser, and the apical whorls are deeply sunken. Young specimens of *ammon* from the same region much resemble *traskii*, but they soon begin to lose their barrel shape and take on the truncated cone shape of *ammon*, the carina is not so sharp and the apex not so deeply sunken.

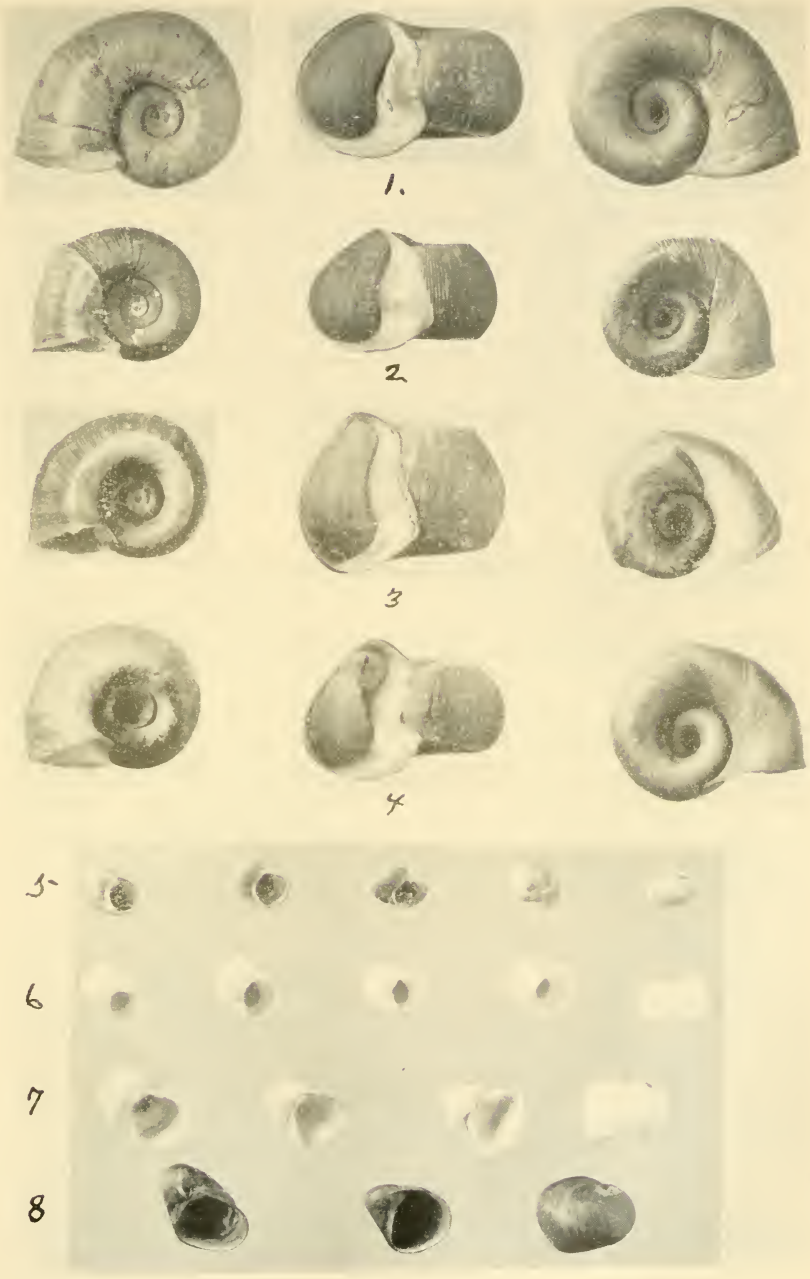
HELISOMA AMMON (Gould). Pl. 9, fig. 4. Described, probably as a fossil, from the Colorado Desert, Southern California, it is found also in the Sacramento and San Joaquin River drainage and near Watsonville, California. An important character is the strong slope of the lateral outline, giving the shell somewhat the shape of a truncated cone. This is shared by most *Helisoma* species, but is more marked than usual in this species. Many much depressed specimens of similar diameter from California might easily be assigned to *ammon*, and there seem to be some intergrades, but I am inclined to believe there is no close relationship between them. I have seen no specimens that can be called *ammon* from the Colorado Desert, and Dr. Pilsbry writes: "I have been in doubt about *Pl. ammon* Gld., if the assigned locality is correct." The type is probably lost. F. C. Baker writes that a cotype in the U. S. National Museum, No. 120951, is so fragile he did not try to photograph it, and measures 21.9 mm. in diameter and 13 in height, labelled "Ancient Lake, Colorado Desert, Blake" collector, in Lea collection.

The shell characters indicate that *occidentalis*, *binneyi*, *traskii* and *ammon* form a natural group, and F. C. Baker has informed me that "those examined agree in genitalia and general radula formation." There appear to be several undescribed *Helisomas* in the western states.

PARAPHOLYX SOLIDA (Dall). Pl. 9, fig. 5. Described from White Pine, Nevada, H. Hemphill, collector. A large series in the Hemphill collection at Stanford University, from which the examples figured were selected, are very uniform in size and show but little variation in shape. It is a perfectly good species, not closely related to any other. It was recorded from this locality as *P. effusa* by Ingersoll, and as *solida*, probably erroneously, from Pyramid Lake, by Stearns.

PARAPHOLYX EFFUSA EFFUSA (Lea). Pl. 9, fig. 8. I have collected this species at many localities in Oregon and California and examined material from other localities in Stanford University collection. While it varies considerably in form at some localities, usually it has a very low spire, the left side rather shortly rounded and transverse diameter much greater than the altitude. The largest one I have seen is 15.5 mm. wide and 11.5 high, another one 14.5 x 11, both from Klamath Falls, Oregon. Usually they are smaller. At many localities two slightly differentiated but easily recognized forms, *costata* (Hemphill) and *diagonalis* Henderson, occur with the typical form. They are seldom, if ever, found without the typical form. I have just received from Professor H. M. Tucker, specimens obtained from Homedale, Idaho, a new State record for the genus.

PARAPHOLYX EFFUSA NEVADENSIS, new subspecies. Pl. 9, figs. 6, 7. This form differs from typical *effusa* chiefly in the fact that the width is usually little if at all greater than the height, sometimes even less, and would be less in many others except for a peculiar spread of the aperture, which appears to be a deformity due perhaps to adverse environmental conditions; and the further fact that the left side of the last whorl is flattened into a broad curve instead of rounding into the base by a rather short curve. Many ex-



Junius Henderson: Western Freshwater Mollusks

amples are almost scalariform. The type, fig. 6, second from left, is 7.25 mm. in diameter, 7 mm. high. It is No. 5843 in the type collection, Geology Department, Stanford University, and, with the figured paratypes, all bleached, is from Winnemucca Lake, Nevada, where dead, probably fossil, shells are abundant on the shore. They occur abundantly in the same condition at Pyramid Lake, all bleached shells. It was recorded from Pyramid Lake by Call and Beecher, as *Pompholyx effusa,* and by Stearns as *P. effusa* and varieties in "a calcareous deposit." I have seen none from either lake that can be considered typical *effusa,* but at Klamath Lake, Oregon, I found some *effusa* showing a tendency to intergrade with *nevadensis.*

PLATE 9

Fig. 1. *Helisoma occidentale* (Cooper). Upper Klamath Lake, Oregon. Neotype, middle figure. University of Colorado.
Fig. 2. *Helisoma binneyi* (Tryon). Whatcom Lake, Bellingham, Washington.
Fig. 3. *Helisoma traskii* (Lea). Antioch, California.
Fig. 4. *Helisoma ammon* (Gould). Lake near Watsonville, California.
Fig. 5. *Parapholyx solida* (Dall). From type lot, White Pine, Nevada.
Fig. 6. *Parapholyx effusa nevadensis,* n. sp. Winnemucca Lake, Nevada. Stanford University collection. Holotype, second figure from left, others paratypes.
Fig. 7. *Parapholyx effusa nevadensis,* n. sp. Pyramid Lake, Nevada.
Fig. 8. *Parapholyx effusa effusa* (Lea). Upper Klamath Lake, Oregon.

A NEW MIDDLE MIOCENE NEPTUNEA FROM CALIFORNIA

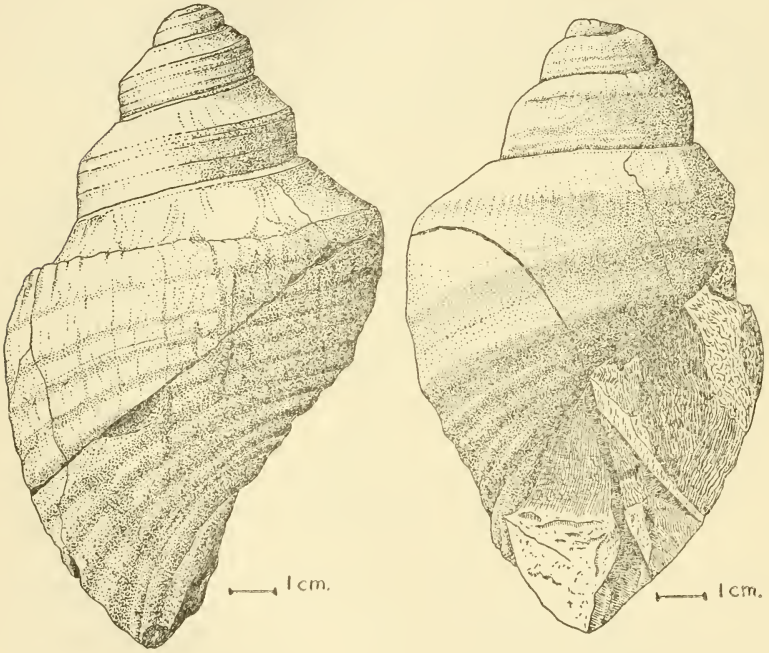
BY U. S. GRANT AND E. H. QUAYLE

During September, 1933, Messrs. J. E. Eaton and Gordon A. Macdonald spent a fortnight in the Caliente Range of

eastern San Luis Obispo County, California, doing geological field work and collecting fossils from the thick Tertiary sediments exposed there. In the collections of Mollusca which were submitted to us the following species occurs which appears to be new.

NEPTUNEA (SULCOSIPHO) EATONI Grant and Quayle, sp. nov. Text figures 1, 2.

Shell large, ventricose, with an elevated spire; whorls 4



or 5 (incomplete), nuclear whorls unknown, the upper two-fifths of each spire whorl with a prominent sloping tabulation and two or three broad, low, rounded, almost obsolete spiral ribs below; body-whorl with about nine larger spiral ribs becoming coarser and more prominent anteriorly. All whorls slightly convex below the tabulation. Body whorl about 1⅘ length of spire. Aperture large, anterior canal rather long (incomplete). Width of body-whorl, 72 mm.; of penultimate whorl, 62 mm.; total length about 130 mm. (incomplete).

Type Specimen: A fine grained sandstone cast (Univ. Calif. at Los Angeles, Cat. No. *3385*) collected by J. E. Eaton and G. A. Macdonald from a megafossil zone designated "MF20" by J. E. Eaton, in Earnest's Canyon, Caliente Mountains, eastern San Luis Obispo County, California (Univ. Calif. at Los Angeles locality No. 477). This fossil zone is apparently in the upper part of the middle of the Temblor horizon, middle Miocene.

This new species is closely related to *Neptunea* (*Sulcosipho*) *stantoni* (Arnold)[1] of the Purisima and Merced formations of the coastal regions of middle California but it is considerably larger and has a relatively much lower spire. It belongs to the section *Clinopegma* Grant and Gale,[2] which includes in addition to *"Buccinum" unicum* Pilsbry,[3] the genotype, *Neptunea* (*Sulcosipho*) *magna* (Dall)[4] and *stantoni* (Arnold). It recalls *Buccinum viridum* Dall,[5] a living whelk from deep water off the Channel Islands of southern California, but the new Miocene species has a longer canal and is very much larger. The new species is named in honor of Mr. J. E. Eaton whose enthusiastic field work has added much to our knowledge of California stratigraphy.

A NEW DRYMAEUS FROM BARRO COLORADO ISLAND, PANAMA CANAL ZONE

BY JAMES ZETEK,
Balboa, C. Z.

DRYMAEUS PILSBRYI, n. sp. Pl. 13, fig. 1. The shell is excessively thin and fragile, imperforate, ovate, of 4.5 whorls, glossy, translucent, having four narrow chestnut-brown bands on a pellucid-whitish ground, the bands situ-

[1] *Chrysodomus stantoni* Arnold, Proc. U. S. Nat. Mus., vol. 34, p. 386, pl. 37, fig. 4, 1908.
[2] Mem. San Diego Soc. Nat. Hist., vol. 1, p. 660, 1931.
[3] Proc. Acad. Nat. Sci. Phila., vol. 57, p. 102, 1905; vol. 59, p. 244, pl. 20, fig. 7, 1907. Japan.
[4] *Chrysodomus* (*Ancistrolepis*) *magnus* Dall, Proc. U. S. Nat. Mus., vol. 17, p. 709, pl. 29, fig. 5, 1895.
[5] Proc. U. S. Nat. Mus., vol. 12, p. 320, pl. 6, fig. 9, 1889.

ated close below the suture, above and below the periferal region and on the base; apex dark. The first 1½ whorls have characteristic *Drymaeus* sculpture, followed by about two whorls with unequal wrinkles of growth and a microscopic sculpture of pits in spiral series, much less close and regular than those of the embryonic whorls. On the last whorl these are obsolete and the surface smooth except for the wrinkling; there being strong wrinkles at wide intervals with smaller ones between them. The aperture is large, ovate, the lip thin, unexpanded. Columella thin, straight above.

Length 11 mm., diam. 8 mm., aperture 6.3 mm. Type, 162124 A.N.S.P.

Length 9.8 mm., diam 7.5 mm., aperture 6.5 mm. 25296 Zetek coll.

This species differs from *D. translucens* by the excessive tenuity of the shell, hardly thicker than tissue paper, by the spaced wrinkles of the later whorls and by the details of the color pattern. Named for Dr. H. A. Pilsbry who has contributed so much to our knowledge of Panama land shells.

This species has also been collected near Pedro Miguel, Canal Zone, on mango trees, and one specimen was collected by me on a leaf of the coconut palm on the mainland close to Ustupu (Portogandi), San Blas coast (Atlantic side). The San Blas shell is more slender than the type, but has the same sculpture and color pattern. It measures, length 8.3 mm., diam. 5.7 mm. The type was collected on an avocado tree on Barro Colorado Island, Gatun Lake, Panama Canal Zone.

NEW FLORIDA PEARLY MUSSELS

BY BERLIN HART WRIGHT

UNIO (ELLIPTIO) WEBBIANUS, sp. nov. Pl. 10, figs. 1, 2.

Shell thin, ovate, polished, epidermis reddish, growth lines smoothly rounded and a trifle darker than the disc. Rayless in all stages of growth. Beaks not prominent, sculptured by a series of double loops and much eroded. Umbonal ridge prominent but not sharply angled. Umbones

1, 2, Unio (Elliptio) webbianus Wright. 3, 4, U. w. hartii Wright.

covered by radiating ridges and furrows, which, intersecting the growth lines, give a decussate or more or less reticulate surface, reaching to near the middle of the disk. Dorsal margin straight, the anterior portion being thin, flat and wing-like. The dorsal notch is very unusually elongated, shallow, and uniformly rounded. Anterior margin bluntly pointed; gracefully rounded below and posteriorly. Nacre is iridescent, pink or flesh colored. Cardinal teeth blunt, thin and very oblique; laterals almost straight. Pallial impressions very indistinct as also the anterior scar. Shell cavity well developed. Length 52 mm., alt. 30 mm., diam. 18 mm.

Habitat, Lake Consuelo, Citrus Co., Fla., near Floral City.

Observations: Named in honor of our long-time friend, Walter F. Webb, whose well-known zeal as a working conchologist has only recently been directed to the naiades for special study. The affinity is with *E. sanctorumjohanium* Wright, but this species is smaller, thinner, less polished, more elongated, and the dorsal notch is longer and more pointed posteriorly. The radiating ridges and grooves are a prominent, distinguishing feature. It is found in practically the same water, an offshoot of Lake Consuelo, connected by a narrow channel with the main body. The type is in the United States National Museum, No. 424923, also paratypes in the following museums: Academy of Natural Sciences, Philadelphia, No. 161594; the Museum of Comparative Zoology, Boston; Buffalo Museum of Natural History, Florida University at Gainesville, and collection of Walter F. Webb, Rochester, N. Y.

UNIO (ELLIPTIO) WEBBIANUS HARTII, nov. subsp. Pl. 10 figs. 3, 4.

Smooth, no radiating ridges and grooves, and is uniformly of lighter color, more solid and somewhat smaller. Its uniform straw-colored epidermis amply distinguished it from the darker, more polished and larger *E. sanctorumjohanium* Wright, though from practically the same lake. Length 43 mm., alt. 24 mm., diam. 15 mm.

The type and paratypes are in the same depositories as the above new species. Named for R. E. and D. L. Hart who have aided me greatly in many ways to make this collecting possible.

A NEW COLONY OF HELIX NEMORALIS WITH SOME OBSERVATIONS ON THEIR COLOR[1]

STANLEY T. BROOKS, PH.D., AND BETTY WATT BROOKS, M.A.

The latest contribution from Miss Mary Johnston, author of "To Have and To Hold," and numerous other articles and novels, is not from her illustrious pen, but from her garden. Dr. George H. Clapp, well-known as a student of the terrestrial mollusca, while on a visit to Hot Springs, Virginia, in November, 1931, heard from some friends of a "plague of snails" that had descended upon a neighboring estate. Immediately, thereupon, Dr. Clapp proceeded to investigate and found a new colony of *Helix nemoralis*. It was a very healthy and apparently well-established colony. The gardeners reported that they had been killing them "by the thousands," though this slaughter had hardly made any impression. It seems that the ancestors of this group were imported from Holland in the earth surrounding the roots of box trees. For this reason, it is assumed that this colony has no connection with any other colony within the United States. It marks an entirely new and different importation.

In studying the banding of the specimens collected by Dr. Clapp, the authors naturally began their study by looking up the descriptions of the various color phases which have heretofore been described. After struggling with the designations and descriptions of Taylor[2] and of Cockerell[3] for some time, and trying to fit the descriptions of color given by them to the various shells, identification proved to be impossible. In the descriptions given by Taylor and Cockerell there proved to be shells which were described as "olivaceous" and colored figures which never could be called "olivaceous." The ambiguity of the method of identification employed by these authors finally decided the case. The

[1] A contribution from the Laboratory of Recent Invertebrates of the Carnegie Museum, Pittsburgh, Pennsylvania.

[2] "Monograph of the Land and Fresh-Water Mollusca of the British Isles," John W. Taylor, vol. III, pp. 274-325.

[3] "Notes on the Variations of Certain Mollusca Introduced from Europe," T. D. A. Cockerell, NAUTILUS, 3, 1889, p. 86.

arrangements of shells under the categories given by Taylor and Cockerell with no accompanying color-chart proved to be most unsatisfactory as well as a natural harbor for human error. The authors of this paper accordingly sought out color-charts and began their work anew. It is not claimed that in the following paragraphs the authors have wholly avoided error, nor is it claimed that they have made a new application of a known system. They, however, do claim that the method herein employed will enable the student to distinguish the various color-phases in a systematic manner, and that it will eliminate the errors that might be existent in any written designation of color. They have applied a system of nomenclature that is available to all. Due to the fact that the present "scientific" nomenclature designating color-phases has no taxonomic standing in conchology, the authors do not feel that the results of this paper are in any degree retrogressive, but that they are for the benefit of taxonomy in their simplicity and in their lack of confusing elements.

Technique.—In determining the various colors of the following lists the authors used the well known "Color Standards and Nomenclature" by Robert Ridgway. It will be unnecessary to go into any great detail of the book as it is a laboratory manual in most of our institutions.

It may be necessary to point out the variation of the shell color through the systems of numbering. The shells are all found to be represented in the (″) series. This group is so designated because of the presence of 42% of pure color admixed with 58% of neutral grey. All of the shells in this collection (275) had the basic ground color illustrated by that portion of the chromatic scale on Ridgway's plates XXIX and XXX. The colors ranged in hue from 13″OY-O (91% orange plus 9% yellow) to 21″O-YY (25% orange plus 75% yellow) and in tint from *normal* (undiluted with white or black) to *f.* The shades ranged from the *normal* to *m.*

In determining the *tint* or *shade* of a shell the basic ground color was compared with the various illustrations.

Any deviation of this color due to the proximity of bands will be indicated in the following discussion. North light was used and the colors noted only during the best period of the daylight.

Series 00000.

	13″OY-O Specimens	15″Y-O Specimens	17″O-Y Specimens
f	0 Pale Cinnamon-Pink	0 Pale Pinkish Cin.	0 Pale Pinkish Buff
d	0 Light Vinaceous-Cin.	0 Light Pinkish Cin.	0 Pinkish Buff
b	0 Vinaceous-Cinnamon	5 Pinkish Cinnamon	0 Cinnamon
norm.	4 Orange Cinnamon	1 Cinnamon	2 Clay Color
i	1 Mikado Brown	1 Sayal Brown	1 Tawny Olive
k	8 Verona Brown	6 Snuff Brown	1 Sarccardo's Umber
m	12 Warm Sepia	0 Bister	0 Sepia
21″O-YY, normal.....45 specimens			Olive Ocher

In any of the following discussion the notations may be compared with the above chart to place the different color symbols.

It is interesting that in this group, only, do we have the color running into the shades. If one will note in the later paragraphs every banded form occurs either in the *normal* or in the tints. The forms *i*, *k*, and *m* of 13″, 15″ and 17″ if listed according to variety and subvariety may be new in respect to the already recorded color phases. Not knowing the colors as they are described, the authors can make no more rigid statement to this effect.

Series 00300.

13″OY-O,	normal	23 specimens.
15″Y-O,	b	1 specimen.
	normal	4 specimens.
17″O-Y,	b	3 specimens.
	normal	10 specimens.
21″O-YY,	b	1 specimen, Deep Colonial Buff.
	normal	117 specimens.

In all of the banded forms as well as in this series the reflected lip presented a color usually close to 69″″RV-R, Aniline Black. The bands also were close to this shade but

are not listed in this paper on account of their constancy and seeming unimportance to the general scheme of coloring. In some, an area of 23″ Yellow d, Primrose Yellow occurred next to the bands. This area being contiguous with the sutures give the latter an edging of yellow. The space between the bands, in many cases, bears the color Cinnamon buff of hue 17″O-Y. *b*. The apertures show the dark color of the lip with a recession within to the Pale Laelia Pink (67″V-R), characteristic of the 13″, 15″, and 17″ forms. None of these accessory colors are taken as important as separation of the color phases can be made entirely upon the ground color plus the band formula.

Series 003:0.
Only three specimens of this formula occurred and they in the *normal* of hue 21″O-YY.

Series 00345.

15″Y-O,	b	4 specimens.
17″O-Y,	b	1 specimen, approaching d.
21″O-YY,	normal	4 specimens.

Series ::300.
Two specimens in the *normal* of hue 21″O-YY.

Series 003(45).

15″Y-O,	b	1 specimen.
17″O-Y,	b	2 specimens.

Series 00340.
One specimen in the *normal* of hue 21″O-YY.

Series 02300.
One specimen in *b* of hue 15″Y-O.

Series 122300.
One specimen in *b* of hue 15″Y-O, but approaching *d* of hue 17″O-Y at band 3.

Series [123](45)...
One *normal* of hue 21″O-YY.

Series (12)3(45).

17″O-Y,	d	1 specimen.
	b	7 specimens.
21″O-YY,	normal	6 specimens.

Series 1(23)(45).
One specimen of hue 17″O-Y, *b*.

Series [*123(45)*].
One specimen of hue 13″OY-O, *normal*, and one *normal* of hue 15″Y-O.

Series 123(45).

13″OY-O,	normal	2 specimens.
17″O-Y,	f	2 specimens.
	b	3 specimens.
21″O-YY,	normal	7 specimens.

Series 12345.
One specimen of *normal*, hue of 21″O-YY.

Series 12345.

17″O-Y,	d	2 specimens.
	b	9 specimens.
21″O-YY,	normal	75 specimens.

Summary.—It would be a fatal mistake to draw any conclusions upon such a study as this. This paper, however, points a way to the elimination of the taxonomic absurdities that have been applied to the various color phases within one species. Instead of trying to apply the principles of specific nomenclature to the field of color, we have applied the color nomenclature. This in itself, if it bears fruit of further study, is sufficient excuse for our time and labor.

INVERTEBRATE REMAINS DUG FROM KITCHEN MIDDENS OF AN OLD ALEUT STONE AGE VILLAGE NEAR DUTCH HARBOR, ALASKA

BY WALTER J. EYERDAM

While engaged in a botanical survey of the Aleutian Islands during the Spring and Summer of 1932, the author and his colleague, Dr. Hulten, curator of the Botanical Museum of Lund, Sweden, found a number of old stone age village sites on some of the islands.

Such evidence of a former culture were noted on the Alaska Peninsula, Unimak, Amoknak, Unalaska, Kagamil, Amlia and Atka Islands. Nearly every large island has been the home of a numerous population in former times. There are large and extensive ancient village sites on

Kagamil Island in the Four Mountain group and on Amlia Island, which probably have never been dug into by the archaeologists' spade. Neither of these islands is now inhabited except by occasional native winter trappers.

The site of a stone age village in the Aleutians can generally be recognized quite easily in the Spring and Summer by the predominating presence of two perennial plants. The most conspicuous of these is *Heraclium lanatum,* the wild rhubard or putschka of the Russians. The other one is the deadly poisonous monkshood, *Aconitum kamtschaticum,* the powdered tubers of which were formerly used to poison arrows. The Ainus of northern Japan still use this plant for that purpose. The Kamchadals also did the same in the early days of Russian occupation.

Ten days were spent during the month of May, 1932, at digging in a stone age village on Amoknak Island, about a quarter of a mile from Dutch Harbor. The exact spot is between the spruce grove and the sea.

About 200 artifacts and implements of various kinds were collected. All of these were made of bone and stone and only one specimen, a kind of awl, seemed to be of ivory.

The workmanship on most of the artifacts is crude and very simple, with almost no attempt at decoration.

A list of all forms of animals remains found in these kitchen middens on Amoknak Island will appear in the "Murrelet" in November, published by the North West Bird and Mammal Society, University of Washington, Seattle, Wash.

Following is a list of Echinodermata and Mollusca found in the kitchen middens.

Two Echinodermata were found, *Strongylocentrotus franciscana,* a few, and *Strongylocentrotus drobachiensis,* very common, and an important food of the old Aleuts.

MOLLUSCA: All species not otherwise noted were common or very common.

Pelecypoda

Saxidomus giganteus Desh.
Paphia staminea Conr.
Pecten islandicus Müller. Few.
Pododesmus (*Monia*) *macrochisma* Desh.
Mytilus edulis Linn.
Modiolus modiolus L.
Entodesma saxicola Baird. Few.
Mytilus californianus Conr. Few.
Cardium corbis Martyn.
Cardium californiense Desh.
Serripes groenlandicus Gmelin. Few.
Macoma middendorffii Dall.
Macoma inquinata Desh. Few.
Tellina lutea Gray. Few.
Siliqua patula Dixon. Few.
Spisula polynyma alaskana Dall.
Mya truncata L.
Mya intermedia Dall.
Saxicava arctica L.

Gastropoda

Beringius crebricostatus Dall. Few.
Chrysodomus liratus Martyn. Few.
Acmaea cassis Esch.
Acmaea c. pelta Esch.
Acmaea scutum Esch.
Acmaea s. patina Esch.
Acmaea s. pintadina Gould.
Acmaea digitalis Esch.
Natica aleutica Dall.
Littorina grandis Dall.
Littorina sitchana Phil.
Mopalia ciliata wossnessenskii Midd. Few.
Mopalia muscosa Gould? Few.
Katherina tunicata Wood.
Cryptochiton stelleri Midd. Rare.

I was able to identify 19 pelecypoda, 11 gastropoda and 4 amphineura or 34 species of shells. These represent nearly all of the more or less common shells which can be found in the vicinity of Dutch Harbor and Unalaska with the exception of very small forms and the extremely common species *Argobuccinum oregonense* Redfield, a rather large snail, and the several species of *Thais* which abound. The old Aleuts seemed to have been very indiscriminate in their choice of animal food, but *Argobuccinum* and *Thais* are too bitter to eat.

The present day Aleuts eat practically the same animals

as their ancestors did with the addition of imported food, but they are rather particular on the whole, because they have become civilized and have more choice. Nearly every kind of mollusk over half an inch was food for the old Aleuts. They were mostly eaten raw.

These old middens were in two layers showing an ancient and a more modern culture. In the oldest layer which was about 3 feet thick there were mostly clam shells and fish bones and almost no artifacts while in the more recent layer there were many remains of large marine animals and many artifacts of stone and bone.

TWO NEW CINGULAS FROM ALASKA

BY G. WILLETT

CINGULA EYERDAMI, new species (Pl. 8, fig. 9).

Shell elongate-ovate, grayish, except for the nuclear whorls, which are dirty white. Whorls rounded, appressed at the summit. Suture strongly constricted. Base well rounded, narrowly umbilicated. Aperture rounded anteriorly, angled posteriorly. Post-nuclear whorls and base smooth to the naked eye, but under a strong lens show very faint, fine spiral striations.

The type, No. 1037 collection Los Angeles Museum, with numerous additional specimens, were collected by Walter J. Eyerdam on Elrington Island, Alaska, and were sent to A. M. Strong of Los Angeles. The type has five whorls, and measures in millimeters: Length, 2.3; diam., 1.2. Paratypes in collections of A. M. Strong and the writer.

This species is similar in general outline to *Cingula aleutica* Dall, but differs from it in much smaller size, posterior angulation of aperture, and presence of spiral striations.

CINGULA FORRESTERENSIS, new species (Pl. 8, fig. 8).

Shell elongate-conic, white. Post-nuclear whorls appressed at the summit, moderately rounded, finely spirally striated. Last whorl elongated, with very narrow umbilical chink. Aperture rounded anteriorly, angled posteriorly.

The type, No. 1038 collection Los Angeles Museum, and eight additional specimens, were collected by the writer at Forrester Island, Alaska. The type measures in millimeters: Length, 3; diam., 1.2.

This species is the most slender of west American Cingulas so far described.

NEW CUBAN LAND SHELLS FROM ORIENTE AND CAMAGUEY PROVINCES

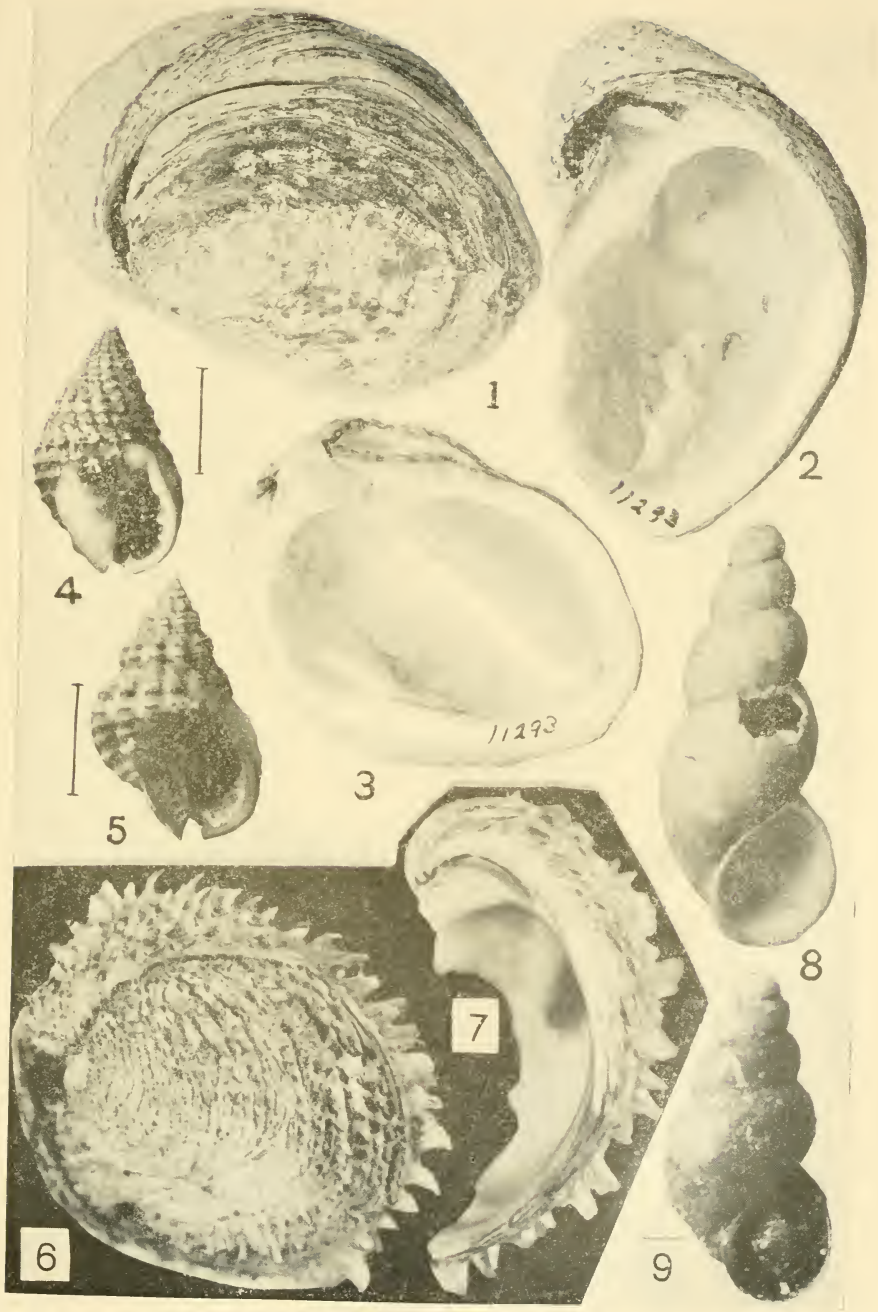
BY D'ALTE ALDRIDGE WELCH

During the summer of 1928 the author had the good fortune to accompany Dr. Henry A. Pilsbry on a collecting trip to Cuba. There, due to the collecting ability of Dr. Pilsbry and the advise of Dr. Carlos de la Torre who told us where to go, we were able to return to the United States with many new forms. I especially wish to thank Dr. de la Torre for having introduced me to the Cuban shell fauna by his unrivaled enthusiasm and generosity, when on my previous visit to Havana in 1927.

A preliminary notice of the operculates from Camaguey province was published in THE NAUTILUS.[1] In the present paper descriptions of these forms are supplied; also descriptions of some new species from Ensenada de Mora in Oriente province, where the sugar *central* of the Cape Cruz Company is located. Among the latter is a certain species of *Cerion* discovered by Dr. de la Torre some years previous to our visit, and which he named in MS. *Cerion ramsdeni.* Due to the fact that the other Cerions found at Ensenada de Mora were subspecies of *C. ramsdeni,* and the expected description not being received from Dr. Torre, I am here describing it under his name.

Ridgway's "Color Standards and Nomenclature" was followed in describing colors. All measurements and counts of ribs were made on the last whorl of the shell unless other-

[1] Welch, d'A. A. "Some Operculate Snails from Northwestern Camaguey, Cuba." THE NAUTILUS, vol. XLII, January, 1929, p. 98.



1–3, Pseudochama inermis (Dall). 4, Nassa moesta lencops P. & L.
5, Nassa bailyi P. & L. (Vol. 46, p. 51). 6, 7, Pseudochama granti Strong x3.
8, Cingula forresterensis Willett. 9, C. eyerdami Willett.

wise stated. All types were placed in the collection of the Academy of Natural Sciences of Philadelphia. Paratypes, besides being in the said collection, are also in the collections of Dr. de la Torre and of the author.

CERION RAMSDENI Torre, new species. Pl. 11, figs. 1, *a-e.*

The shell is cylindric with conic summit, having 10-10½ whorls, the last three being of about equal size, the rest forming the cone, the umbilical chink is deep. The embryonic shell of 2 whorls is smooth, the remainder of the shell is sculptured axially by ribs irregularly spaced. The intervals are roughened by weak axial wrinkles. The color is pallid quaker drab, darkened by splotches of brownish drab, located on the cone and on the ventral sides of the shell. The aperture is ovate, the peristome smooth, heavy and reflected. The interior of the throat is cinnamon drab. The parietal lamella ascends about ½ a whorl, the axial lamella about 2 whorls. Length 24.2 mm., diam. 11.7 mm. Four paratypes measure: 28.5 x 12.8 mm., 25.7 x 11 mm., 22.4 x 11.5 mm., 19 x 6 mm.

Cerion ramsdeni shows great variation, ranging from specimens strongly ribbed to those only faintly and sparsely marked by weak striations, the latter being rare. The color may be gull grey or purplish grey. The throat may be white.

Habitat: Playa Rincon, Ensenada de Mora, Oriente, found in large numbers on the sea grape (*Coccoloba*) trees, approximately a dozen to the square meter, by Welch, August 15, 1927. These were identified by Dr. de la Torre, and I learned he had been there previous to my visit. Further series were collected by Pilsbry and Welch, August 3, 1928.

CERION RAMSDENI PORTILLONIS, new subspecies. Pl. 11, fig. 2.

The shell is similar to *Cerion ramsdeni* differing from it in size, being constantly smaller. The ribs are more closely set and more evenly spaced. The color is white but specimens may be marked splotches of army brown but this is fairly rare. Length 19.4 mm., diam. 9.7 mm. Paratypes (*b-d*) measure from 15 x 8.4 mm. to 21 x 10 mm.

The locality is along the shore road about 10 kilometers east of Ensenada de Mora, near Portillo, Oriente province.

They were found in great abundance, about a dozen to the square foot, on grass and trees. Collected by Pilsbry and Welch, August 11, 1928. Specimens collected by us from Aguada, 4 kilometers east of Ensenada de Mora, on August 11, 1928, are intermediate between *C. r. portillonis* and *C. ramsdeni*. They were also abundant, about a dozen to the square meter. They measure from 20 x 9.5 mm. to 22.8 x 10.8 mm. (Pl. 11, figs. 2 *e, f.*)

CERION RAMSDENI TURGIDUM Torre & Welch, new subspecies. Pl. 11, figs. 3, *a-d.*

The shell is cylindric, having 9½ whorls, the last 5 of which are of about equal size and decrease slightly in diameter towards the aperture giving the shell a topheavy appearance; the remaining whorls form the very short, blunt apical cone. The suture is impressed for the first 3 whorls, then it becomes squeezed out into a ridge which reaches its maximum protrusion on the 5th and 6th whorls, after that the ridge becomes more and more pushed in until on the last whorl the suture is slightly impressed. Thick, white, regularly set ribs ornament the shell axially. Between and parallel to these the almost perfectly smooth ground is roughened by occasional wrinkles, often obsolete. On the dorsal anterior surface of the last whorl a raised ridge appears. The color is pale ecru-drab, deepening in places. The throat is light buff. The umbilical chink is deep. The parietal lamella enters about ⅓ of a whorl, the axial lamella about 2 whorls. In some specimens the suture is impressed for the last 4 whorls, the exact beginning of the impression of the sutures and the degree vary in different specimens. Length 27.8 mm., diam. 13.2 mm. Type, 148229 A.N.S.P. Paratypes measure:

Length	Diam.	Length	Diam.
20.7 mm.	12.0 mm.	27.8 mm.	12.0 mm.
22.0 mm.	10.5 mm.	28.8 mm.	13.0 mm.
26.1 mm.	14.4 mm.		

Habitat: The west slope of the hill west of the Toro River about 1 kilometer from the beach or "Ojo del Toro," west of Ensenada de Mora, Oriente. The mollusks were very rare, for only 2 live specimens were found and not more than a dozen dead specimens. Those found alive were on trees. At Ojo del Toro *Cerion ramsdeni* was found on

the east side of the river, while on the west side intermediate forms between *C. ramsdeni* and *C. ramsdeni turgidum* were found. Collected by Pilsbry and Welch, August 8, 1928.

CHONDROPOMA (CHONDROPOMORUS) TEXTUM BOONEAE, new subspecies. Pl. 11, fig. 4.

The shell is ovate conic, truncate, consisting of 4-4½ whorls, the umbilicus is narrow, the last whorl very shortly solute. The color is pinkish buff with chocolate spots in spiral bands. The sculpture is made up of spiral and axial threads both equally high and smooth. At their junction the threads become thickened into roundish knots thus giving the surface a reticulated appearance. The suture is well impressed and ornamented by roundish blade-like nodules, which give it a crenulated aspect. These nodules on the earlier whorls are more blade-like and pointed than the later ones, for these are quite blunt. About the umbilical region the spiral threads become much thicker, forming veritable cords rising quite above the ground, so that flat valleys are made. The peristome is double. The inner peritreme protruding above the outer only along the outer margin, for nearing the umbilicus it fades from view and becomes part of the outer peritreme, then it becomes separated again by a faint line under the penultimate whorl. The outer peritreme is narrowly expanded along the outer margin, becoming increasingly broad near the umbilicus where it is very slightly deflected backwards. Thus the umbilicus is excluded from view by the expanded lip, but is entirely left open. Beneath the penultimate whorl, of which it stands free, the outer peritreme is exceedingly thin. The aperture is vertical, ovate, obtusely pointed. No breathing device was found. The operculum is typical of the genus. Length 16 mm., diam. 8 mm. Paratypes measure from 11.8 x 6.8 mm. to 16.4 x 8.4 mm.

This subspecies differs from *Chondropoma textum* Gundlach in that it becomes solute at the aperture, has a narrower outer peritreme, the sculpture is smoother and less sharp, the axial threads are weaker, wider and more widely spaced, the knot-like junctions of the threads are flatter and less pointed, the suture is crenulated by less pointed tubercles or nodules.

Habitat: This mollusk was found in dry weather among

leaves close to the ground and under stones. After a rain, although many could be obtained in the above mentioned way, most of them could be picked off the bark of trees and rocks. The type locality is La Vigia, a general name for the hills north of the site of the stables of Mr. Alfred Harrison, Jr., who lived at Ensenada de Mora, Oriente Province, for many years. No. 150746 A.N.S.P. The shell is named in honor of Miss Lee Boone, a distinguished student of zoology.

(To be continued)

BOSTON MALACOLOGICAL CLUB

The Boston Malacological Club held its regular meetings during the season of 1932-33 on the first Tuesday evening of each month from October to May, inclusive, in the lecture-hall of the Boston Society of Natural History.

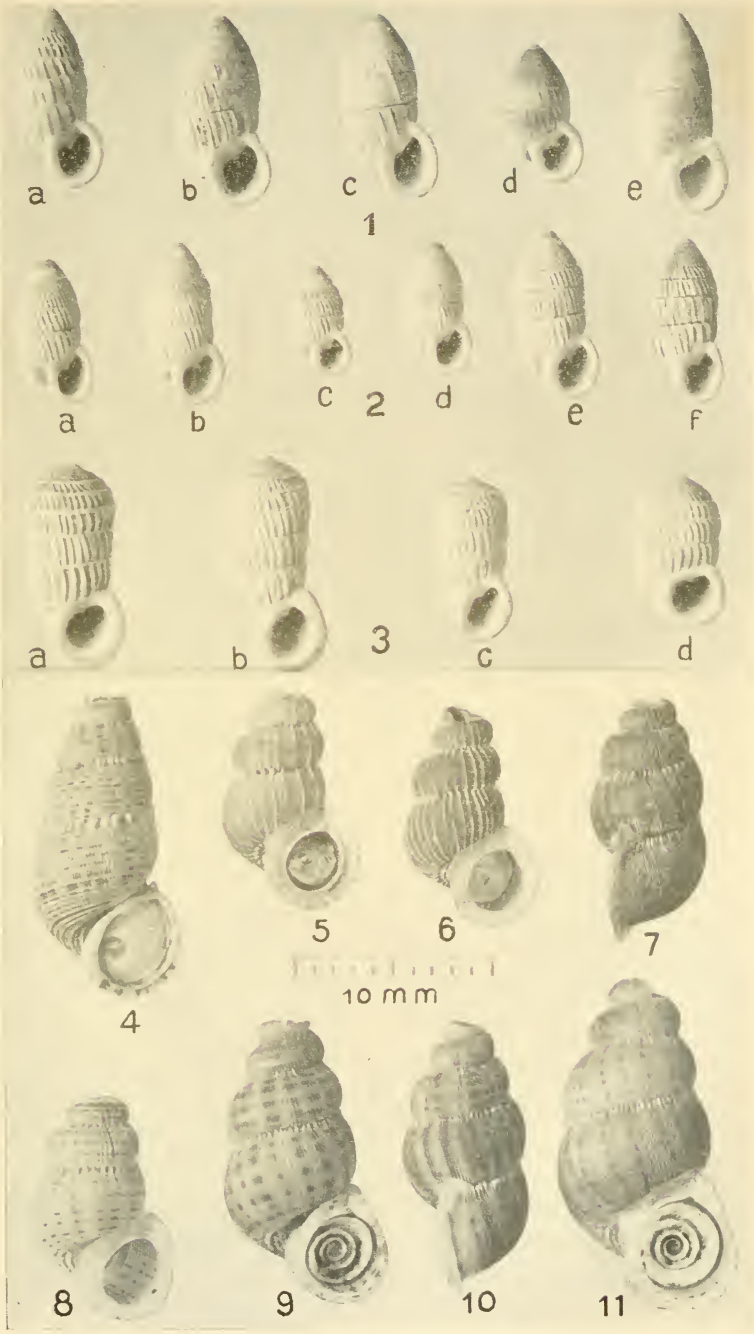
At the business meeting of May, 1932, the club had elected Mr. Charles W. Johnson, president, and his death, which occurred in July following, was deeply felt by the members.

The October meeting was given over to summer collecting experiences by members, and to forming plans for the next meeting.

This, the November meeting, was devoted to honoring the memory of Mr. Johnson, a charter member of the club, who had always had its interests keenly at heart, and who had twice served as its president.

The programme on this occasion included addresses by six speakers, each of whom brought his tribute of appreciation of some phase of Mr. Johnson's work and interests.

Dr. Glover M. Allen told of his able and efficient work as curator, both in Philadelphia, and at the Boston Society of Natural History, and Mr. William J. Clench spoke of his great distinction in the field of conchology, calling attention to his monumental list (as yet unpublished) of the shells of the Atlantic coast, from Labrador to Texas.



Welch: New Cuban Land Shells.

Mr. S. N. F. Sanford dealt with Mr. Johnson's philosophy of life, and his views on the qualifications necessary for a true scientist—qualifications which he himself possessed in ample measure—and emphasized the keen wisdom and foresight which caused him to see the great and increasing importance of a knowledge of insect life, from an economic standpoint, and therefore to make this study his specialty.

Prof. Francis N. Balch spoke warmly of him as both a friend, and a scholar—with high praise of his standards of scholarship; and Mr. J. Henry Blake told of his long and close connection with the Boston Malacological Club during its twenty-two years of existence.

Dr. Joseph C. Bequaert, the last speaker, dwelt upon many phases of Mr. Johnson's work in entomology—his field-work, his enthusiasm, his wide knowledge and astonishing memory, and the fact that he had become, since 1893, a leading authority on the Diptera.

Letters from Dr. Pilsbry and Dr. Lewis concluded the evening, and thus the Malacological Club paid its tribute of honor and remembrance to a valued member.

At this meeting the office of president was filled by the election of Dr. Bequaert.

In December, the speaker was Dr. Hubert L. Clark of Harvard, who told of collecting on the coast of Australia, and at Lord Howe Island, a scrap of terra firma but seven miles in length, and some five hundred miles from Sydney, N. S. W.; and at the January meeting Dr. Bequaert gave a paper compiled by himself and Mr. Clench, on "The Freshwater Mollusks of Africa," these being divided into three classes—the coastal or estuarine species, the fluviatile, and the lacustrine.

In February, Dr. Charles H. Blake, of Massachusetts Institute of Technology, spoke on the Invertebrate Life of Mt. Desert Island, telling of the results of seven seasons of dredging, in and around Frenchman's Bay, while the March meeting was given over to exhibits and exchanges. The members brought choice specimens from their own col-

lections, and several informal talks were given concerning the exhibits.

In April the club was addressed by Mr. Graham B. Fairchild, who spoke on variations in Liguus, and exhibited a fine collection of these shells. In May, Dr. Hervey W. Shimer, of Massachusetts Institute of Technology, gave a paper on the "Mesozoic-Cenozoic Transition," illustrated by charts and lantern slides.

The final meeting was the club's annual field day, which was held at Plum Island, Mass., on June 2nd. It proved not as good a collecting place as are many other localities, but the day was a beautiful one, and all those who attended enjoyed the occasion.

THEODORE WILLARD, *Secretary.*

ROBERT HAINES TREMPER

In the passing of Robert Haines Tremper, the Conchological Club of Southern California loses one of its best loved and most enthusiastic members. Dr. Tremper died of heart disease in his eightieth year, at his home in Los Angeles on the 26th of October, 1933. A pioneer among the shell collectors of the Pacific Coast, he had a wide acquaintance with early conchologists and developed his collection until it was considered one of the finest in California. His home in Los Angeles was a veritable museum and he took great pleasure in showing his beautiful shells to visitors. He also enjoyed helping young conchologists who often came to him for aid in identifying specimens.

Dr. Tremper spent his childhood in New Richmond, Ohio, and from there went to the University of Michigan where he not only received a medical education but also completed the dental course. About fifty years ago he moved to Ontario, California, where he began dental practice. After twenty-five years of active service, he retired and began to devote his time to his hobby, the study of shells. Part of his collection is on display in the Los Angeles Museum

where he has been Honorary Curator of Conchology since he moved to Los Angeles, twelve years ago.

Some years after the death of his first wife, Dr. Tremper married Miss Belle Briggs, a life-long friend. The six years of their married life was spent in constant companionship, taking many trips to the beach together and working on his valuable collection. Mrs. Tremper was also a lover of shells and a member of the Conchological Club. Upon hearing of her husband's death, Mrs. Tremper suffered a stroke and died the following day. They were buried together in Bellevue Cemetery, Ontario, California. Dr. Tremper leaves one daughter, Mrs. W. J. Franklin, of Los Angeles.

A number of rare and interesting shells of the Pacific Coast, discovered by Tremper, have been named in his honor by the late Dr. W. H. Dall, one of his personal friends, and others by Dr. Paul Bartsch. His collection included many sets and series showing variation in species. His specimens were always carefully selected and cleaned, and neatly mounted. He posessed a keen sense of observation, which, with his expert knowledge and thorough training, stamped him as an outstanding conchologist. His passing is mourned by a large circle of friends and especially by those who were associated with him in the field of conchology.

HOWARD R. HILL.

NOTES

SOME RANGE EXTENSIONS IN NORTHERN CALIFORNIA AND SOUTHWESTERN OREGON.—In studying the land and freshwater material which we have collected during the past two years in Del Norte County, California, and along the coast of Oregon between the state line and the mouth of the Umpqua River, we find that we have a number of things not hitherto reported from this region. We are glad of this opportunity to make our notes available to those interested.

Polygyra germana germana Gld. Previous record, Eugene, Ore.; new localities, Scottsburg (on the Umpqua River), Empire (on Coos Bay), Ophir. Somewhere in the 60 miles between Ophir and the Oregon-California line this species seems to be replaced by *P. loricata nortensis* Berry, but we did not find the meeting point.

Vertigo columbiana "Sterki" Pils. Previous record, Douglas County, Ore. Specimens which may be this species were found at Enderts Beach (5 miles south of Crescent City, Calif.). Klamath, Calif., many young specimens were found in late June.

Pristiloma lansingi Bland. Previous record, Eugene, Ore.; new localities, Empire, Ore., Endert's Beach and Klamath, Calif.

Pristiloma stearnsi (Bland). Previous record, Portland, Ore.; new locality, Empire, Ore., with *P. lansingi.*

Carychium occidentalis Pils. Previous record, Springfield Junction, Ore.; new localities, Ophir, Ore.; Endert's Beach and Klamath, Calif. Always in mixed maple and alder leaves, fairly abundant but the colonies very limited in area.

Ferrissia caurina Cooper. Previous record, Ten Mile Lake, between Bandon and Coos Bay, Ore.; new locality, mill pond at Crescent City.

We are indebted to Mr. Allyn Smith for his assistance both in looking up old records and in comparison of specimens.—E. P. AND E. M. CHACE.

MEIOCERAS BERMUDEZI, new name for *M. constrictum* P. & A., NAUTILUS, vol. 46, p. 122, not *Caecum constrictum* Gabb, also a *Meioceras.* Mr. Bermudez has kindly called our attention to the preoccupation of the name *constrictum,* which we here change to *bermudezi.*—PILSBRY AND AGUAYO.

PUBLICATIONS RECEIVED

STUDIES IN THE VARIATION, DISTRIBUTION AND EVOLUTION OF THE GENUS PARTULA: THE SPECIES INHABITING MOOREA. By Henry Edward Crampton. (Carnegie Institution of Washington Publication No. 410, 335 pp., 24 plates.) This is the third installment of Professor Crampton's magnificent work on Partula, the first treating of the species of Tahiti, and the second those of the Mariana Islands. A large part of the work is occupied by the descriptive and biometric data. This material is deeply interesting to all concerned with Partula, or with Pacific Island faunas; but the general results of Crampton's study, which concern all who deal with problems of variation and evolution, are already so condensed in his summaries that no brief statement can cover the ground. The species of Moorea were studied in five visits, from 1907 to 1924. Over 60,000 adult shells and nearly as many immature and embryonic shells were collected. The island was thoroughly covered and important localities visited more than once. It was found that noticeable changes had taken place in the snail populations, not only since the time of Garrett, over 60 years ago, but even in the years between Crampton's visits.

To the three species with 8 varieties[1] found by Garrett in Moorea, Crampton's explorations added no less than 7 new species and one variety. In treating of the numerous color-classes he has recognized that the conventional nomenclature is incapable of expressing the grades of variation which have to be considered, and has adopted a terminology applicable to all grades below the subspecific (pp. 185-6), many of the color-classes being common to different specific and varietal stocks. This seems to us the wisest course with a situation frequently encountered in mollusks.

The ten species of Moorea are unequally related. Crampton recognizes 7 fundamental stocks of former times. Four of these have persisted without differentiation, but three

[1] Crampton uses "variety" in the sense of *subspecies* of most systematists.

became split into two descendants each, now ranked as species. Some have further split into varieties, of which *P. taeniata* has 6, each with its characteristic distribution and variation. In some other species the differentiation has not reached the degree sufficient for varietal rank, though similar in kind. These give the picture of an early stage in the evolution of such complexes as *P. taeniata*. "The essential point is that the components of a species are genetic groups of various grades." There are some species which represent a single colonial element, and seem not to have become differentiated into races, or to have spread much beyond their place of origin; and, as Crampton demonstrates, some formerly widely spread forms are now reduced by extinction to narrow limits.

Relations with Tahitian species indicate that the Moorean forms are not descendants of a single primitive species, but arose from several stocks. "We are compelled to postulate prior land-connections between islands of the same group, and between now-isolated archipelagos to account for the present existence of undoubted relatives upon separated islands" (p. 196). As the writer advocated this view years ago[2] partly from the evidence afforded by Partula, it is a pleasure to find that Crampton's studies, which are based upon far more extensive and exact data, have led him to a similar conclusion.

Evidence is given showing that new mutations occur independently, such as sinistral embryos in dextral mothers, and dextral in sinistral mothers, in areas where all adults found are coiled in one direction, and the possibility of male parents of different coil is practically nil. There is similar evidence of color mutations. Data are presented showing notable recent expansion of the ranges of certain species, such as *P. aurantia*, since the time of Garrett.

As to the underlying causes of evolution, Crampton's work in Moorea confirms his prior work, concluding that "So far as the present material is concerned, the factors responsible for specific, varietal and lesser distinctions are

[2] Proc. A. N. S. Phila., 1900, p. 568.

congenital in nature and location, and that environmental circumstances produce no discernible effects upon the course of organic differentiation." "All efforts to discover real effects of external conditions have proved futile."

It should be added that the typographic dress of the Partula volumes is worthy of the subject matter. The eight plates of shells by Hoen and Co., comprising 450 colored figures, are among the most perfect and beautiful ever produced. We can only express our admiration of the volumes Prof. Crampton has completed, and our hope that the volume treating of the leeward Society Islands will soon be brought out.—H. A. P.

THE NON-MARINE MOLLUSKS OF YUCATAN. By J. C. Bequaert and W. J. Clench. ("The Peninsula of Yucatan: Medical, Biological, Meteorological and Sociological Studies," chapter 28. Carnegie Inst. Pub. No. 431.) The State of Yucatan, occupying the northern half of the Peninsula, is covered by this paper, which is based on collections made by Dr. Bequaert in the region of Chichen Itzá, and numerous smaller lots taken by different naturalists elsewhere. The number of species is small for so large an area, comprising 44 terrestrial, 12 fresh water and 10 brackish water shells; "and it is unlikely that future explorations will add much to it." "The relations of the fauna are entirely Central American." The credentials of each species reported from Yucatan have been carefully scrutinized, and references to former literature are given. *Spiraxis* (*Volutaxis*) *maya, Drymaeus shattucki* and *Choanopoma gaigei* are new species. Maps of the State of Yucatan and of the entire peninsula accompany this useful report.—H. A. P.

NOTES AND DESCRIPTIONS OF LAND MOLLUSKS FROM THE BAHAMA ISLANDS . . . obtained during the "Utowana" Expeditions of 1932-3. By William J. Clench. (Proc. New England Zool. Club, vol. 13, pp. 77-100.) Besides notes on various known species, some 9 species and 5 subspecies are described as new, belonging to the genera *Eutrochatella*,

Opisthosiphon, Succinea, Drymaeus and *Cerion.* Records are published for the first time from Conception and Mariguana Islands and East Plana Key.

NOTES ON THE BRACKISH WATER BIVALVE POLYMESODA CAROLINIANA (Bosc.). By Henry Vander Schalie. (Occ. Pap. Mus. Zool. Univ. Mich. No. 258.) Observations were made on specimens from small creeks of the Newport and Neuse drainages, near Beaufort, N. C. These clams tolerate a wide range of salinity. Nine individuals of 14 kept in normally saline running sea water survived at the end of two weeks, when the trial was discontinued. In some places it inhabits water practically fresh, and elsewhere it lives where the extremes of density change with the tides. The range of *P. caroliniana* is mapped, the extreme points being in Texas and North Carolina.

LAND MOLLUSKS FROM THE ISLANDS OF MINDORO AND LUBANG, PHILIPPINES. By Wm. J. Clench and A. F. Archer. *Helicostyla* (*Calocochlea*) *monacha* and *H.* (*C.*) *aopta,* new species, and 7 new subspecies are described.

TRANSPOSED HINGE STRUCTURES IN LAMELLIBRANCHS. By W. P. Popenoe and W. A. Findlay, 1933, Trans. San Diego Soc. Nat. Hist. vol. 7, pp. 299–318, 1 plate. A transposed lamellibranch hinge is defined as one that exhibits in the right valve the hinge elements normally occurring in the left valve, and *vice-versa.* The terms inverse and reversed have also been used for the same condition. In examining over 5000 valves a total of 26 were found with this variation, in the genera *Venericardia, Astarte, Transennella* and *Unio.* Approximately 2000 shells of other genera examined, mostly common venerids and tellinids, yielded no examples of transposition. It may be noted in this connection that partial transposition is rather common in the Sphaeriidae, as described by Sterki, NAUTILUS 35: 100. No shell was found showing complete transposition involving cardinals, anterior and posterior laterals. In all specimens possessing anterior laterals, these have been transposed with the cardinals; if posterior laterals are present they are either normal, while the cardinal and anterior laterals are transposed, or transposed, while the other teeth are normal. It is not considered to be a pathologic condition.—H. A. P.

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MELONGENA CORONA AND ITS RACES

BY H. A. PILSBRY AND E. G. VANATTA

Melongena corona is one of the commonest large shells of the Gulf coast of Florida, everywhere variable, but at the same time readily divisible into several fairly recognizable racial strains, which though doubtless well known to shell collectors, do not seem to be adequately noticed in the books.

In its several races *M. corona* ranges from the Indian River region on the east coast around the keys and up the west coast somewhat further. We have not seen it from the northern shores of the Gulf. It was reported from Texas and Guadeloupe by Dall, but no definite place in Texas was mentioned, and the Guadeloupe record certainly needs confirmation. There is, we believe, no authentic West Indian record. Frank C. Baker recorded specimens collected by him in Yucatan (Proc. A. N. S. Phila., 1891, p. 50), but these belong to a strongly marked subspecies. For a large shallow water shell the distributional data seem remarkably incomplete, and we will be glad to have further records, accompanied by specimens when possible, showing the limits of the species on the Atlantic coast and in the Gulf. Does it occur on the coast from Alabama to Texas?

Joseph Willcox wrote of its feeding habits in NAUTILUS 10:27, 1896.

MELONGENA CORONA (Gmelin). Pl. 12, figs. 3, 4.

Gmelin's species was based on figures in Chemnitz which represent the common form with erect (that is, backward pointing) or incurved spines at the shoulder. It was the form without a basal circle of spines (pl. 12, fig. 4); but

this varies individually, and these anterior spines may be either present (pl. 12, fig. 3) or wanting among shells of most colonies. The name *Melongena belknapi* Petit de la Saussaye (Journ. de Conch., vol. 3, p. 65, pl. 2, fig. 5, 1852) was proposed for the form exactly like the type but with a basal circle of spines. It seems to have no racial value. The spines at the shoulder are either erect or incurved typically, but sometimes they flare outward more or less. An anterior series of spines is often present in the quite distinct but related species *Melongena melongena* (L.), and therefore it may be assumed that this character was present in the ancestral stock of *M. corona*. In *subcoronata* and its derivative *perspinosa* these spines are strong and constantly developed, but in the typical *corona*, a more evolved stock, they are a decadent structure, being as often absent as present.

Fusus bicolor Say (Journ. A. N. S. Phila., vol. 5, p. 215, 1826) is a very young *corona* 12 mm. long, according to the type, No. 34276 A.N.S.P. At this stage no spines are developed. The ordinary length of *M. corona* is 75 to 125 mm. (3 to 5 inches), but we have seen it up to 190 mm. It is very abundant on the west coast of Florida.

Several varieties which at present we regard as ecologic forms and not true races have been described, as follows:

M. corona form *inspinata* Richards, pl. 6, fig. 1 (NAUTILUS, Oct., 1933, p. 57), differs by being thinner with the shoulder narrowly rounded, without spines; the basal series of spines developed on the last half turn; size as in *corona*. We have seen two specimens, the type and a paratype which we owe to Mr. T. Van Hyning. Though two localities, "near Sarasota" and "Palma Sola," were given, there is every reason to believe that they are out of the same lot. Both were procured from Mr. J. H. Holmes, and were collected by the late Mr. Chas. B. Lungren of Ozona, Fla., who wrote as follows: "I collected the spineless *Melongena corona* some years ago for Mr. Holmes. I was at Bishop's Harbor on the south side of Tampa Bay, near the Manatee County line. There are some small sloughs at

the head of the harbor draining small ponds which are salt water in dry weather but very dirty reddish brackish water in the rainy season. I collected the *Melongena* in what I consider the freshest water they could live in, but the shells were of large size and fine color, very thin and without spines. The locality is near Terra Ceia."

M. corona form *minor* (Sowerby), pl. 12, fig. 6 (*Hemifusus corona* var. *minor* Sowb., Proc. Zool. Soc. London, 1878, p. 798, pl. 48, fig. 13, Key West) is the dwarf form, 50 mm. long, more or less, which inhabits protected mud flats, often in great profusion. It has otherwise exactly the structure of typical *corona*, and like that, may have a few spines in a basal circle, or spines at the shoulder only. It is apparently an ecologic form, often found constant in the small size, but in other places running up to the size of small *corona* proper. It occurs on the west coast at least as far up as typical *corona*, on the keys, and up the east coast, more or less typically developed, to Indian River, where it sometimes shows a tendency to be longer, approaching the following form.

M. corona form *altispira*, n. f., pl. 12, fig. 5. An extremely long, narrow form from Oceanus, Brevard Co., near the northern limit of the species on the east coast. The diameter is about half the length or less. The spines are as in *corona*, erect or suberect at shoulder, few or wanting in the basal series. Two measure: length 71 mm., diam. 31 mm., aperture 42 mm., and 60 x 29 mm.

MELONGENA CORONA SUBCORONATA (Heilprin). Pl. 12, fig. 2.

Trans. Wagner Free Inst. Sci., vol. 1, p. 70, pl. 1, fig. 3, 1887.

The shell is wider and shorter than *M. corona*, with strong shoulder-spines projecting at right angles and always strong spines in a basal series. This is the form of the Caloosahatchie Pliocene, but we have typical specimens marked "Post-pliocene, Little Sarasota Bay" collected by Jos. Willcox, one of which is figured. The assigned age should be checked up if the deposit worked by Willcox can be found. Heilprin and Dall considered *subcoronata* specific-

ally distinct from *corona*, and perhaps it is; but for the present we leave it in this connection.

A strongly marked form from the Caloosahatchie Pliocene has been named var. *aspinosa* Dall. It usually has much stronger axial sculpture than Dall's figure shows.

MELONGENA CORONA PERSPINOSA, n. subsp. Pl. 12, fig. 1.

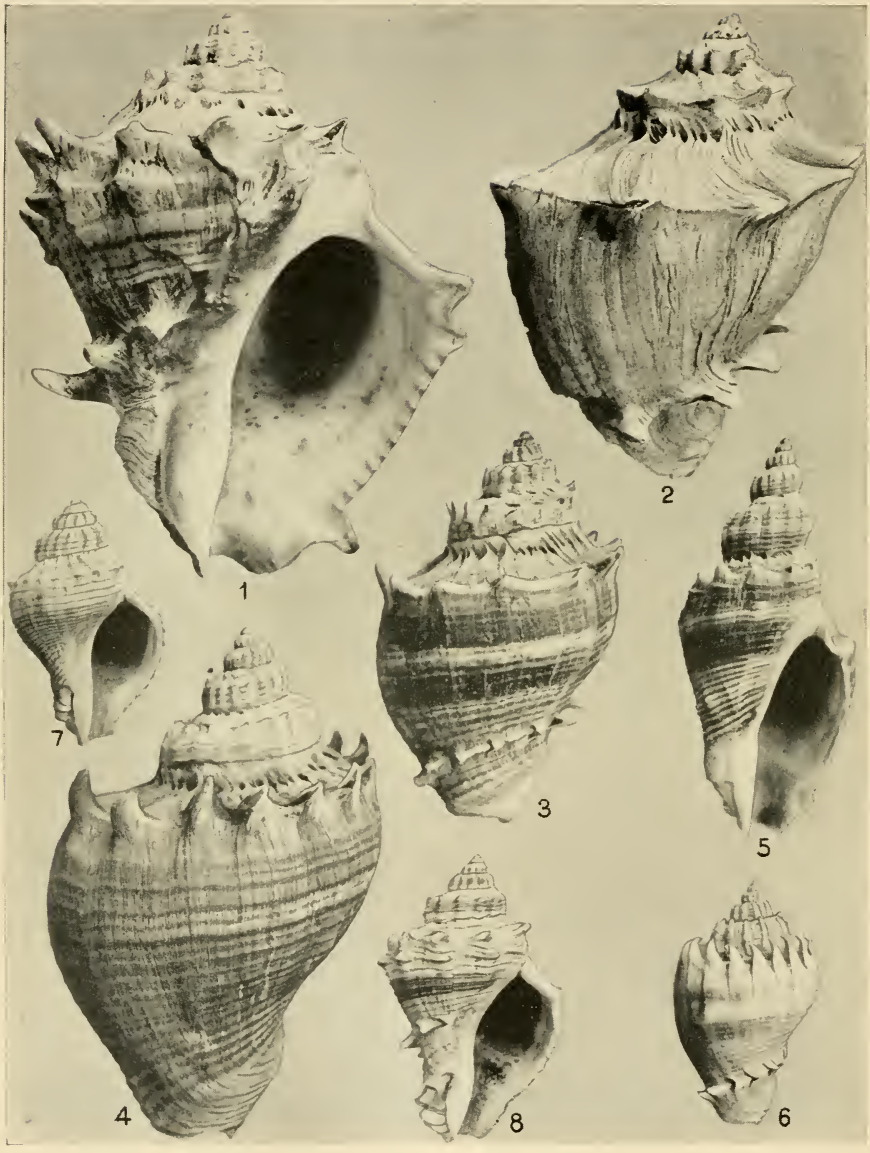
Large, heavy, wider than *corona*, with a wider aperture, and with shoulder spines standing out at right angles and doubled or tripled by accessory spines below the regular series; basal series of spines always well developed. The figured type measures, length 109 mm., diam 80 mm.; it is often larger, but does not reach so large a size as some *M. corona*. The localities known to us are all on the west coast from Tampa Bay south to Marco Pass and Lossman's key.

This is evidently the direct descendant of the Pliocene *subcoronata*, and if that is considered a distinct species, this living race will be called *M. subcoronata perspinosa*. It differs from the fossil form only by the multiplication of spines.

MELONGENA CORONA BISPINOSA (Philippi). Pl. 12, fig. 8.

The siphonal fasciole bears a series of elevated scales. The shoulder has moderately developed spines, typically with a second series below them. The basal series of spines is developed but rather small.

This race has been described and figured by Philippi, 1844, Abbild, u. Beschreib. neuer Conch., vol. 1, p. 94, *Pyrula* pl. 1, figs. 7, 8; Petit, 1852, Journ. de Conch., vol. 3, p. 157, pl. 8 fig. 3; Reeve, 1847, Conch. Icon., vol. 4, *Pyrula* pl. 6, figs. 19 *a*, *b*. None of these authors knew the locality, and the typical specimens in our collection are not localized, but as a very closely related variety occurs in Yucatan, we believe that typical *bispinosa* will be found on the Mexican coast also. The form seems to have been neglected by American conchologists, though its essential character, "prope canalem serie squamularum instructo," was formulated nearly a century ago. In all the Florida series of *corona* forms, the prominent siphonal fasciole, while often



1, *Melongena corona perspinosa*, Lossman's Key. 2, *M. c. subcoronata*, North Creek, Little Sarasota Bay. 3, *M. corona*, Little Sarasota Bay. 4, *M. corona*, Marco. 5, *M. c.* form *altispira*, Oceanus. 6, *M. c.* form *minor*, Clearwater Harbor. 7, *M. c. bispinosa* form *martiniana*, Silam. 8, *M. c. bispinosa*. Yucatan. All three-fourths natural size.

roughened, does not have the strong, regular scales of *bispinosa*. It does not attain the size of *M. corona*.

A form of *bispinosa* occurring at Silam and Progreso, Yucatan, has the siphonal fasciole similarly scaled, but the shoulder spines are reduced to small tubercles, the basal spines are small or sometimes wanting. Specimens seen are small, length up to 52 mm., but they may not be adult (pl. 12, fig. 7). This form has been named *Pyrula martiniana* Pfr., by Philippi, 1844 (Abbildungen, etc., vol. 1, p. 94, pl. 1, fig. 9). Further series are needed to show just what relation this form has to typical *bispinosa*, and whether it is separable. For the present we include it in *bispinosa* as a synonym.

A NEW VARIETY OF LIGUUS

BY AL. PFLUEGER

LIGUUS SOLIDUS DOHERTYI, subsp. nov. Pl. 13, figs. 2, 3.

Structure: The shell is thin, highly polished; whorls moderately convex, 7½ in number; columella thin, straight and slanting. Texture of very fine growth-lines. *Color:* Pale straw yellow with faint smoky lavender streaks on the spire. A dark purplish-brown line 1 mm. wide on the periphery, this line becoming a suprasutural line ascending the spire. There is a sutural line of the same color, half a mm. wide. A series of equidistant brown axial streaks, beginning on the second whorl, becoming squarish spots as they descend the spire and gradually enlarging until on the sixth whorl they become mere blurs, these latter ascending the spire and fading out on the fourth whorl. Apex pink, columella white. Length 54.7 mm., width 28.3 mm.; aperture 24 x 14 mm.

Lower Matecumbe Key, Florida, Al. Pflueger leg., Sept., 1933. Holotype in coll. Al. Pflueger, paratypes in collections of Pflueger and R. F. Deckert.

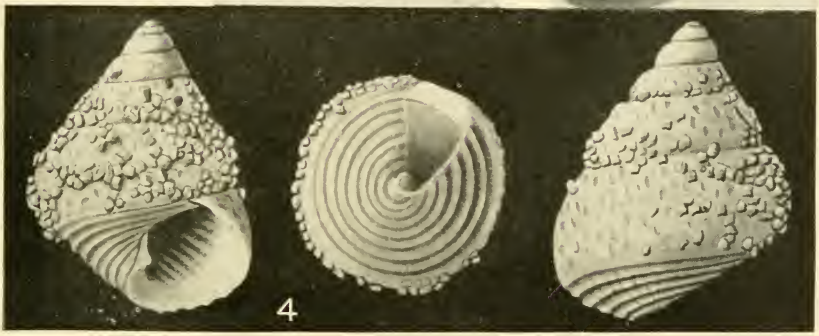
This form looks like *L. s. pseudopictus* with a pink apex. Some specimens show a few distinct bluish axial streaks on the spire. Many have a much larger number of green lines than the holotype. This shell occurs in a pure colony, none of the other Matecumbe Ligui being found with it. Named in honor of Col. Henry L. Doherty.

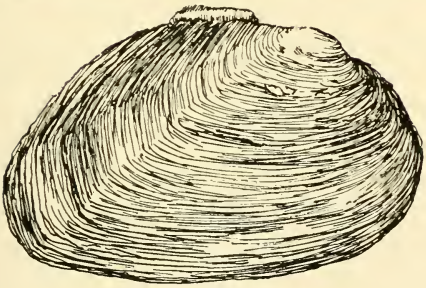
NOTES ON WESTERN LYMNAEIDAE

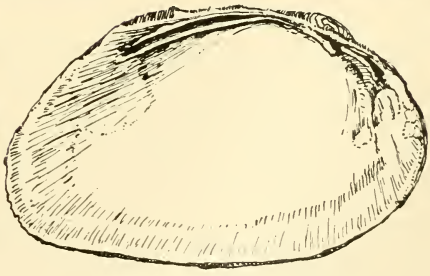
BY JUNIUS HENDERSON

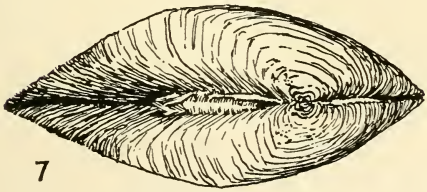
LYMNAEA (STAGNICOLA) PALUSTRIS NUTTALLIANA Lea. Pl. 14, fig. 6. This form was described from "Oregon." Baker made it a synonym of *palustris* in 1911, but in 1928 made it a subspecies. It is the most widely and generally distributed form of *palustris* in the western states, occurring from the Rocky Mountains to the Pacific Coast, south into California. In 1932, with Professor Hugo G. Rodeck, the new curator of the University of Colorado Museum, I traversed Montana from east to west and from south to north, crossing the state in both directions along two widely separated lines, and found it at all favorable localities examined, obtaining actual collections at 62 localities. It is the only *Lymnaea* of the *palustris* group we found, except at one or two localities, which yielded *wyomingensis*. The material obtained confirms my suspicion that this and *haydeni* Lea, described later from the Yellowstone and Big Sioux Rivers, are synonymous, a conclusion affirmed by Mr. F. C. Baker, in correspondence. The material hitherto reported as *haydeni*, from Idaho, should be referred to *binneyi*.

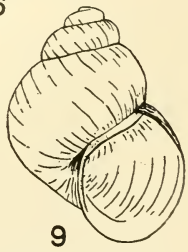
LYMNAEA (STAGNICOLA) BINNEYI Tryon. This species was described from "Hell Gate River, Oregon," in 1865. Baker, in his Monograph, interpreted that to mean Hell Gate River, Montana, as others have done, and as I supposed to be correct, but I am now in doubt about it. Two











1, Drymaeus pilsbryi Zetek, (p. 93). 2, 3, Liguus solidus dohertyi Pflueger. 4, Psammodulus mexicanus Collins, x 11. 5–8. Elliptio n. sp., B. Hart Wright. 9, Lyogyrus vanhyningi Vanatta x 13.3.

collecting trips in the Hell Gate drainage in Montana failed to reveal it, and it is not in any other collections I have examined from any Montana locality, unless a few we obtained in Yellowstone River a few miles south of Livingstone are correctly so identified. There is another possibility. Mr. W. J. Eyerdam wrote me last June that Hell Gate is a name used in the early days for Rogue River, in southwestern Oregon, and that there is on that river, below Agness, a place still called Hell Gate. The portion of Montana including Hell Gate River had been separated from Oregon long before Tryon's publication, first having been placed in Washington, then in Idaho, and Montana Territory with its present boundaries was organized in 1864. Tryon may have meant just what he said when he wrote "Hell Gate River, Oregon," and in another paper in the same volume he placed Hell Gate River of the present state of Montana in eastern Washington. Did he really know two Hell Gate Rivers or was he just careless or ignorant of the geography and history of the West?

In this connection some records of *Goniobasis* may be significant. Bland, using Cooper's notes, in 1861, reported *Goniobasis* from Hell Gate River, apparently, from the context, meaning the one in Montana. Tryon, 1865, repeated the record, citing Cooper, and definitely saying "Hell Gate River, Washington Terr., a branch of Clark's Fork of the Columbia River, near the eastern boundary of the Territory." Though not in Washington Territory as at that time bounded, there is no possible doubt that the Montana stream was intended. Ingersoll, 1874, again reported *Goniobasis* from Hell Gate River, Montana, and Missouri River below the Falls, citing Cooper. I have diligently searched both streams without finding any, and so far as I have learned no one else has found any *Goniobasis* in either Montana or Idaho, and it has been reported at no locality east of Walla Walla and Yakima in Washington. As *Goniobasis* does occur in southwestern Oregon, one may well wonder whether the Oregon stream may not be the one for this record also. All of this applies as well to *Physa malle-*

ata Tryon, described from Hell Gate River, Oregon, also in the 1865 paper. Collectors and authors were even more careless about localities in the early days than some of them are now.

LYMNAEA (STAGNICOLA) PALUSTRIS WYOMINGENSIS Baker. Pl. 14, fig. 2. This subspecies was described without figure from western Wyoming and eastern Idaho. It has been found also at various localities in Colorado, Utah and southwestern Montana.

To complete descriptions and for purposes of comparison I am figuring also holotypes, paratypes or topotypes of the following recently described species of Lymnaeidae: *Stagnicola magister* Baker, *S. impedita* Baker, *S. proxima buttoni* Baker, *S. hemphilli* Baker, and *S. elrodi* Baker and Henderson.

PLATE 14

Fig. 1. *Stagnicola magister*. Holotype, left; paratype, right. Stanford University collection. Rhett (Tule) Lake, California.

Fig. 2. *Stagnicola palustris wyomingensis* Baker. Topotypes. Ten miles south of Lander, Wyoming. University of Colorado Museum.

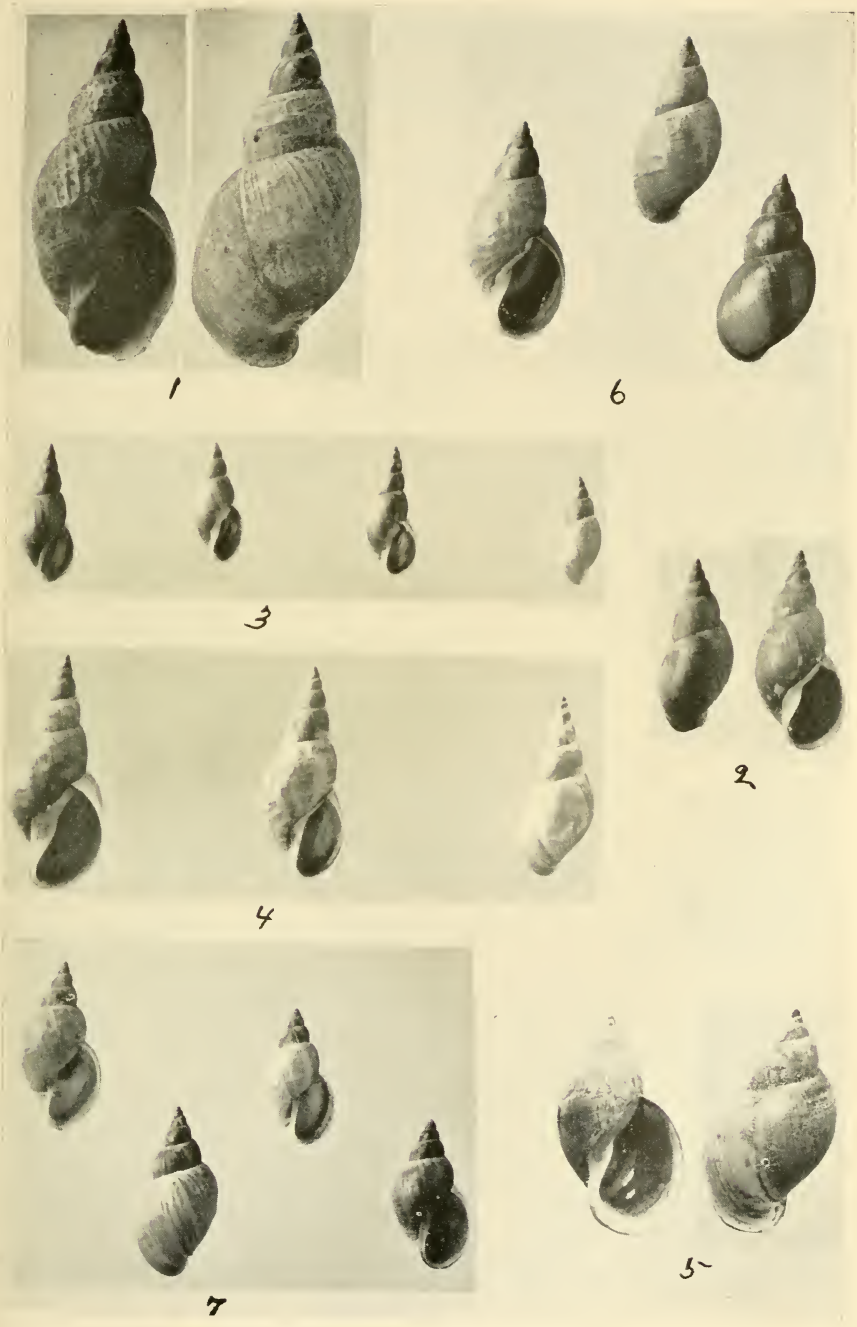
Fig. 3. *Stagnicola impedita* Baker. Holotype, left; others are paratypes. Stanford University collection. Utah, near Logan.

Fig. 4. *Stagnicola proxima buttoni* Baker. Holotype, middle; others are paratypes. Utah, Salt Lake City. Stanford University collection.

Fig. 5. *Stagnicola elrodi* Baker and Henderson. Topotypes. Flathead Lake, Montana. University of Colorado Museum.

Fig. 6. *Stagnicola palustris nuttalliana* Lea. One mile east of Harlowton, Montana. University of Colorado Museum.

Fig. 7. *Stagnicola hemphilli* Baker. Holotype, right; paratypes, left. Salt Lake City, Utah. Stanford University collection.



Junius Henderson—Western Lymnaeidae.

LAMPSILIS JONESI, A NEW NAIAD FROM SOUTHEASTERN ALABAMA

BY HENRY VANDER SCHALIE

In April of 1932 a large series of naiades was sent for identification to the Museum of Zoology of the University of Michigan by the Alabama Museum of Natural History. In this material there was a fine series of specimens collected in 1915 from the Pea River in southeastern Alabama by Mr. Joe A. Burke. Thirty-two specimens taken from ten stations proved to be a new species. All of them came from the Pea River in Dale and Barbour Counties.

Since the discovery of this new species I have been trying to obtain living material so as to include here a comparative study of the soft parts. A collector at Elamville (Barbour County) has made several attempts to get living specimens, but has not succeeded. On a joint expedition of the Museum of Zoology and the Museum of Comparative Zoology, Mr. William J. Clench and I visited the Pea River, near Elamville, last summer. We found the river abnormally high, making conditions decidedly unfavorable for collecting. We learned from the local collector, Mr. N. K. Byrd, that in recent years the Pea River has remained in flood condition.

L. jonesi is found not only in the Pea River but also in the Choctawhatchee River. Mr. Clench and I collected it from the West Fork of that River, about seven miles east of Ozark, Dale County; and also from the East Fork of this same river, about eight miles west of Abbeville, Henry County, Alabama.

LAMPSILIS JONESI. Pl. 15.

Shell: Subovate or elliptical, moderately elongate; anterior end rounded; the lower and upper margins evenly rounded, nearly parallel; the posterior end definitely biangulate, with a well developed posterior ridge. Sexual differences are present; the female usually has a slight constriction on the lower margin of the shell, just anterior to the marsupial swelling; the male has a more evenly rounded ventral margin. Beaks full, but not high; their sculpture

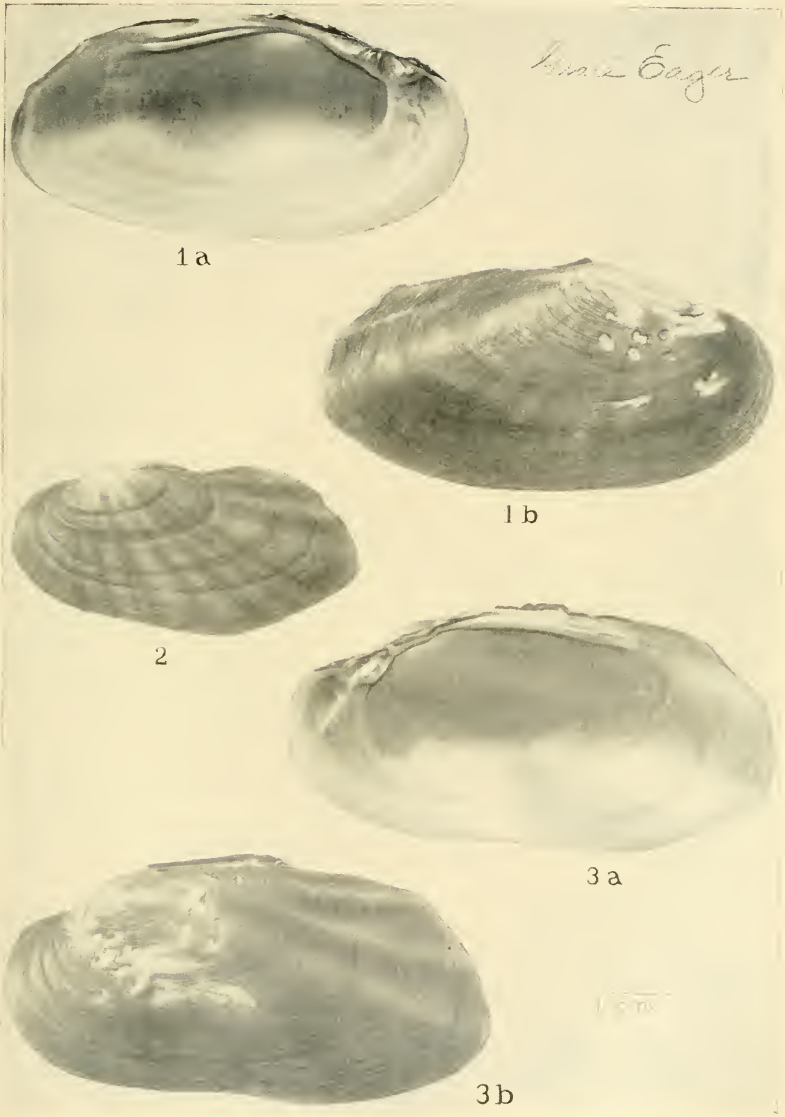
not seen. Epidermis smooth, shining, olivaceous green or olivaceous yellow, usually marked with irregularly distributed green rays, which are often not very pronounced. Left valve with two solid, compressed, jagged pseudocardinals and two remote, thin, slightly curved, granular laterals; right valve with two pseudocardinals, the upper rudimentary, the lower usually well developed, stumpy, and jagged, and one thin, granular, slightly curved lateral. *Muscle scars:* Anterior adductors distinct and well impressed; the posterior only slightly impressed. Nacre bluish-white, thickened anteriorly, thinner, and slightly iridescent posteriorly.

	Length	Diameter	Height	Obesity
Male Type, Figs. 1 *a*, *b*.	46.0 mm.	16.0 mm.	22.5 mm.	34.78%
Female Type, Figs. 3 *a*, *b*.	48.5 mm.	18.0 mm.	23.0 mm.	37.11%
Young Female Type, Fig. 2.	34.5 mm.	10.5 mm.	16.0 mm.	30.43%
Measurements of the thirty-two specimens give the following averages	47.5 mm.	16.5 mm.	23.0 mm.	35.00%

Type locality: Pea River, at Priston's Mill, Dale County, Alabama. J. A. Burke, collector, November, 1915. Types in Alabama Museum of Natural History; paratypes in Alabama Museum of Natural History, Museum of Zoology of the University of Michigan, and the Museum of Comparative Zoology. Forty-three specimens, representing twelve localities, were examined.

This species has been named after Dr. Walter Jones, Alabama State Geologist and Director of the Alabama Museum of Natural History, who has kindly permitted me to study the naiades in the collection of the Museum, and who has been helpful in every other way.

Mr. William B. Marshall has kindly compared the types of this species with related species in the National Museum. In a letter regarding the shells, he writes: "The only species that approaches them is *Lampsilis villosa* B. H. Wright. This species is figured in the *Proceedings of the Academy*



Lamsilis jonesi H. Vander Schalie

of Natural Sciences of Philadelphia, 1900, page 77, plate 1, figure 1. Your smaller specimen is a male; the larger one probably is a female. Your specimens differ from *villosa* in several particulars: yours is proportionally longer, and has the posterior ridge subangulate. A prominent difference is the character of the posterior margin. In *villosa* it is almost uniformly rounded, but in your species it is distinctly three-angled on the posterior margin. Two of the angles are due to well-marked riblets on the posterior area, and the third angle is at the terminus of the posterior ridge. The angles are more easily seen in an anterior view. Your shells certainly are subspecifically and probably specifically distinct from *L. villosa*. I have seen no specimens of *Lampsilis wrightiana* Frierson, a species of this same general group, but from the description, it seems to be different from your shell." If Mr. Marshall had seen the young of *jonesi* (fig. 2), he would have noted that the species is closely related to *Lampsilis subangulata* (Lea), a species occurring with *jonesi* in the Pea River and Choctawhatchee River drainages. *L. jonesi* differs distinctly from *subangulata* in that it has a prominent posterior biangulation and posterior ridge; it is not nearly so brightly rayed; the lower margin is not so distinctly rounded; and the teeth are more stumpy and jagged.

PSAMMODULUS, A NEW MIDDLE MIOCENE MODULID FROM THE ISTHMUS OF TEHUANTEPEC, MEXICO

BY R. LEE COLLINS
Department of Geology, Johns Hopkins University

Abstract.—This paper describes and figures *Psammodulus mexicanus*, a new genus and species of gastropod from the middle Miocene marine beds of Santa Rosa, Vera Cruz, Isthmus of Tehuantepec, Mexico. The outstanding characteristic of this curious mollusk, is the habit of cementing foreign particles to the surface of the spire like the well

known genus *Xenophora*. The aperture and ornamentation on the base of the shell suggest that *Psammodulus* is probably a near relative of *Modulus*.

The middle Miocene marine fauna from Santa Rosa, Vera Cruz, on the Isthmus of Tehuantepec, Mexico, contains a small shell that is quite distinct from any fossil or Recent gastropod genus with which I am acquainted. The aperture and sculpture on the base of the shell simulate the genus *Modulus* of Gray, but the spire is covered by agglutinated sand grains which suggests relationship with *Xenophora* of Fischer de Waldheim. Similarity to the latter group however, is limited entirely to the habit of attaching foreign bodies to the spire of the shell. In all other features the Mexican specimens appear to be closely related to *Modulus*. From the habit of attaching sand grains to the shell surface this new gastropod is designated *Psammodulus*.

PSAMMODULUS MEXICANUS, new genus and species. Pl. 13, fig. 4.

Shell small, relatively heavy, turbinate. Nucleus slender consisting of about two smooth whorls, below which the spire is covered by agglutinated sand grains or by pits in the shell surface from which the grains have been lost. Grains more or less oriented in oblique rows that are roughly parallel to the outer margin of the aperture. Suture distinct. Aperture subcircular, oblique to axis of the shell. Columella bearing a well defined basal, horizontal tooth below which lies an excavated area. Margin of inner lip slightly reflected. Parietal callus relatively heavy. Interior of outer lip bearing about ten fine lirations. Sculpture of base consisting of about eight strong spiral cords with fine spiral threads on the interspaces. Spiral sculpture crossed by faint, unevenly developed axial threads.

Figured type: Length 3.4 mm., diameter 2.5 mm.

The apical whorls are not all preserved on the type specimen, therefore the apex appears rather blunt in the figure. Some specimens have a well defined, but narrow umbilicus, others have the umbilical opening very nearly obscured by the margin of the inner lip and there are also slight variations in the taper of the spire and the strength of the columellar tooth.

At first glance this shell appears to be a young *Modulus* somewhat similar to *Modulus modulus basileus* (Guppy) described and figured by Woodring[1] from the Bowden beds, middle Miocene of Jamaica, that through some freak of fossilization has had sand grains cemented to the spire surface, but not on the base of the shell. However, the following evidence is deemed sufficient to prove that the Mexican shell is a new and distinct form. There are seventy specimens in the collection and all of them show the same general characters. The Santa Rosa sediment consists of soft friable sand with minor amounts of shell and other organic fragments and the grains range in size from fine silt to coarse grit. From this variety of material the creature appears to have selected and used on the surface of the shell, at any particular place, grains that are roughly of the same general size. The foreign material is composed entirely of mineral matter, not a single shell or other organic fragment was noted on any one of the lot of specimens. Many of the grains are clear quartz and the particles on the earlier, smaller whorls are quite definitely smaller than those on the later whorls. The grains are oriented more or less in rows parallel with the shell aperture. The body whorl is rounded and the spiral sculpture of the base begins at a point well below the periphery of the shell. The sand grains are present on the body whorl from the suture to the upper spiral cord of the base and in only a very few specimens is there so much as a single grain below the first spiral. As a final bit of evidence, there are two small shells in the Santa Rosa collections, of a typical *Modulus*, which appears to be the same species as that described by Woodring from Bowden. These specimens resemble most closely the specimen pictured on plate 26, figures 1 and 2, of Woodring's work. They are about 3 mm. in diameter, or in other words, of comparable size to the shells of *Psammodulus*.

[1] Woodring, W. P. Miocene Mollusks from Bowden, Jamaica. Part 2, Gastropods, Carnegie Inst. Washington, Pub. 385, pp. 343-344, pl. 25, fig. 17, pl. 26, figs. 1-4, 1928.

There seems to have been in this new gastropod, a curious specialization of that part of the mantle lying below the suture of the shell and above the first spiral on the base. That part of the mantle not only deposited shell material, but also apparently had a peculiar affinity for mineral grains which were picked up, held in position and cemented firmly in the matrix during periods of shell enlargement.

NEW CUBAN LAND SHELLS FROM ORIENTE AND CAMAGUEY PROVINCES

BY D'ALTE ALDRIDGE WELCH

(Concluded from page 108)

OPISTHOSIPHON (OPISTHOSIPHON) ANDREWSI Welch. Pl. 11, fig. 5.

The shell is thin, oblong conic, the suture well impressed, umbilicate, truncate, leaving 3½ convex whorls, nonsolute. The color is cinnamon-buff, but in the paratypes is light pinkish cinnamon, cinnamon or snuff brown. The sculpture consists of hollow axial ribs quite widely spaced, the early whorls being more closely ornamented than the later. Parallel to these ribs are a few thin threads, and in line with these are low crinkly strae, seen only under the microscope, covering the ground. The spiral sculpture is made up of faint regularly set thickenings of the ground appearing strongest on the last whorl; also the bulbular projections at the summit of the ribs on their touching the suture, giving the later a crenulated appearance. About the umbilicus there are three rows of tubercles similar to those about the suture, the outer row is larger than the inner ones. The aperture is oval, the peristome double, the inner portion projects slightly, is narrow and a little indented at the posterior angle; the outer broadly expanded, fluted, coarsely sculptured with radiating ribs. Near the umbilicus it is adnate to the whorl above, at the posterior angle the peristome is deflected backwards on touching the penultimate whorl and ends in a siphon which bends downwards into the suture just back of the aperture. The internal connection of the siphon is just inside the aperture at the posterior margin. The operculum is typical of the genus.

Length 11.8 mm., gr. diam. 8.0 mm., less. diam. 5.4 mm., 19 major ribs. Type.

Length 11.7 mm., gr. diam. 7.8 mm., less. diam. 5.3 mm., 14 major ribs.

Length 11.7 mm., gr. diam. 7.3 mm., less. diam. 5.0 mm., 15 major ribs.

Length 11.5 mm., gr. diam. 7.0 mm., less. diam. 5.3 mm., 19 major ribs.

Length 10.6 mm., gr. diam. 7.2 mm., less. diam. 5.0 mm., 14 major ribs.

Length 10.4 mm., gr. diam. 6.3 mm., less. diam. 4.6 mm., 12 major ribs.

The shell is related to *O. lamellicostatum* Torre and Henderson, but the umbilicus is not closed and it has fewer major ribs. Found on rocks, limestone cliffs and trees by Pilsbry and Welch on the south slope of the Loma de Florencia, Florencia, Cameguey (a part of the Sierra de Jatibonico). The creature was not plentiful, not more than 16 specimens being found on the entire hill. The shell was named after Professor E. A. Andrews of the Johns Hopkins University to whom I owe most of my biological training. Type 148847 A.N.S.P.

OPISTHOSIPHON (OPISTHOSIPHON) TORREI Welch. pl. 11, fig. 6.

The shell is thin, umbilicate, truncate, elongate-conic having 3-4 convex whorls, the last not solute, the suture well impressed. The color is deep brownish drab; in some specimens pale ochraceous buff, pinkish buff, or light pinkish cinnamon, deepening towards the last whorl into wood brown. The sculpture is made up of white, narrow, hollow axial ribs placed at irregular intervals, being closer on the first whorls and more separated towards the aperture. Each rib is enlarged at the summit into a rounded blade-shaped tubercle slightly concave at the left; between some of the ribs and parallel to them appear thin threads; the ground is further cut by crinkly striations parallel to the threads and visible through a microscope. The ground is also roughened by thickenings fairly evenly spaced and arranged so as to spirally sculpture the shell. Along the outer margin of the umbilicus two rows of small blade-like protuberances similar to those about the suture appear on the ribs, these projections grow slightly longer and thicker the farther they go into the umbilicus, the outer row is larger than the

inner. The aperture is ovate, obtusely angled above, the peristome double, an inner peritreme narrow, smooth, slightly projecting, and an outer peritreme broadly expanded, sculptured with fluted concentric laminae. Near the umbilicus there are two grooves or nicks in the lip. The first is anterior and smaller than the second which is directly above the umbilicus; from the last groove the outer peritreme slopes forward to the penultimate whorl to which it is adnate. Over the aperture it forms a delta-shaped projection which is deflected backwards ending in a siphon. The entrance to the siphon from the interior of the shell is just inside the aperture at its posterior angle. The operculum is typical of the genus.

Length 11.4 mm., gr. diam. 7.0 mm., less. diam. 5.1 mm., 30 major ribs. Type 148848.

Length 12.3 mm., gr. diam. 8.9 mm., less. diam. 5.5 mm., 29 major ribs.

Length 11.8 mm., gr. diam. 7.2 mm., less. diam. 5.3 mm., 28 major ribs.

Length 11.4 mm., gr. diam. 7.3 mm., less. diam. 5.5 mm., 32 major ribs.

Length 10.0 mm., gr. diam. 6.0 mm., less. diam. 5.0 mm., 33 major ribs.

Length 9.7 mm., gr. diam. 5.8 mm., less. diam. 4.7 mm., 30 major ribs.

This operculate is intermediate between *O. andrewsi* and *O. lamellicostatum* T. & H. Collected by Pilsbry and Welch, July 11, 1928, on the first hill east of the Chambas River, the western ridge of the Sierra de Cacarratas about one mile from the town of Florencia, Camaguey. The shell was also found on the rocks and trees of the Loma Palma on the opposite side of the river, which is part of the eastern ridge of the Sierra de Jatibonico. Specimens from the type locality although rare, not more than 15 specimens being found, were more numerous than at the Loma Palma, visited by Welch in September, 1929.

OPISTHOSIPHON (OPISTHOSIPHON) CUNAGUAE Welch. Pl. 11, fig. 7.

The shell is ovate conic, truncate consisting of 3½-4 convex whorls, the sutures are well impressed, the umbilicus is open, the last whorl non-solute. The color is black, but may be brownish drab, pinkish cinnamon, or warm buff. The axial sculpture is made up of fine threads close to-

gether, between and parallel to which the ground is covered with striae seen only with a microscope. There is no spiral sculpture except for the row of hollow tubercles formed by the expansion of certain threads on touching the suture. Within the umbilicus 6-8 pronounced spiral rows of small hollow tubercles similar to those about the suture appear in the form of thickenings of the threads. The shell is further ornamented by bands of dark purple or black dots which are so arranged that they run axially and spirally. The aperture is ovate, obtusely angled above, the peristome is double consisting of a smooth, thin slightly projecting inner peritreme, and an outer one broadly expanded, coarsely sculptured with fluted concentric laminae. Near the umbilicus it is deflected backwards hiding the umbilicus from view, but not sealing it, the outer peritreme then slopes gently to the whorl above to which it is adnate. Above the posterior angle of the aperture the lip expands into a V-shaped depression, deflects backwards into a siphon which projects downwards into the suture behind the aperture. The interior connection of the siphon is found just inside the posterior angle of the aperture. The operculum is typically parachondroid.

The type, 148844 A.N.S.P., a female, measures: Length 12.7 mm., gr. diam. 7.8 mm., less. diam. 6.0 mm.

Females		Males	
Length	Diameter	Length	Diameter
11.0 mm.	7.5 mm.	9.0 mm.	6.8 mm.
11.4 mm.	7.7 mm.	9.4 mm.	6.7 mm.
11.7 mm.	7.6 mm.	9.8 mm.	6.9 mm.
12.2 mm.	7.9 mm.	10.2 mm.	7.2 mm.
12.6 mm.	8.4 mm.	10.7 mm.	7.1 mm.

Collected by Pilsbry and Welch, July 17, 1928, at Cunagua hill, approached from Colonia Galan, Cunagua, Cameguey province, Cuba. They were found in abundance on rocks and trees, approximately a half a dozen to the square meter. The black forms were by far the most numerous, making up about 95% of the entire number collected.

Choanopoma (Annularodes) uncinatum indivisum Welch. Pl. 11, fig. 8.

The shell is oblong conic, truncate leaving 4-4½ convex whorls, umbilicate, non-solute. The color is ivory yellow, shading to chamois on the upper whorl, but may be wood

brown, light buff, or dark vinaceous drab; it is moreover decorated by bands of purplish dots which run axially and yet are so placed that they are also in spiral rows. The axial sculpture is made up of closely set threads. The spiral sculpture is lacking except for the row of hollow tubercles which surrounds the suture at the summit of some of the threads. About the umbilical wall there are 12 rows of small projections similar to those about the suture. The number of rows varies on different specimens from 10-14 rows. The aperture is oval, the peristome double. The inner peritreme is smooth, slightly projecting, thin; the outer is narrowly expanded along the outer margin, increasing in width on nearing the umbilicus where it slopes gently backwards partly covering the umbilicus from view but leaving it wide open. Above the aperture it is adnate to the penultimate whorl, near the posterior angle it is deflected back into a siphon which curves downwards into the suture just behind the aperture. The interior opening of the siphon is just inside the aperture at its posterior margin. The operculum is typical of the genus.

Type, 147880 A.N.S.P., measures: Length 15.3 mm., gr. diam. 8.6 mm., less. diam. 7.0 mm. Paratypes measure, males 11.9 x 7.5 mm., to 13.9 x 8.3 mm.; females from 14.6 x 8.1 mm., to 17.5 x 8.9 mm.

C. uncinatum indivisum differs from its nearest relative *C. uncinatum* Arango in that the last whorl does not become as free from the penultimate whorl, the form is slightly more conic, the siphon is more knob shaped, and less long when measured in a line along the suture. I am indebted to Dr. Paul Bartsch for giving me specimens of Arango's species, which were collected by John B. Henderson. They were from the Loma de Ternero, Santa Clara Province.

Habitat: The south slope of the Loma de Florencia, the hill north of the town of Florencia, Camaguey. Collected by Pilsbry and Welch July 11, 1928, the animals were found in abundance, approximately a dozen to the square meter. Also collected by Welch at the Loma Merino, the Loma Mabua, the Loma Palma, and by the guide David Compagoni at the Loma Aguacate and the Loma Marroqui, September, 1929.

CHOANOPOMA (ANNULARODES) PILSBRYI Welch. Pl. 11, fig. 9.

The shell is ovate conic, truncate, having 4½-5 convex whorls the last is non-solute, the umbilicus is closed. The color of the type is cream-buff, varying in tint, but paratypes are greyish brown, cinnamon buff and dark vinaceous drab. The shells are further colored by army-brown spots ranged spirally or axially; in some specimens the spots appear to be part of axial bands, in others they fade out almost completely leaving an apparently unicolored shell, but on observation under the microscope the spots can be noted. The spiral sculpture is lacking excepting the five spiral cords about the closed umbilicus. The axial sculpture consists of closely spaced threads thickened at the suture into lanceolate tubercles. The aperture is oval, the peristome double. The inner peritreme is smooth, thin, slightly projecting; the outer peritreme coarsely sculptured by irregular crinkly layers, thinly expanded along the outer margin of the lip, but nearing the umbilicus it becomes more expanded and is deflected backwards completely sealing the umbilicus; it is adnate to the penultimate whorl. Above the aperture the lip is bent forward forming a delta-shaped depression, then backwards ending in a curved siphon, disappearing along the suture. The siphon connects with the interior of the shell by a pore found inside the aperture at its posterior margin. Related to *A. uncinatum Arango* but is much larger and has the umbilicus closed.

Type 148846 A.N.S.P., a female, measures: Length 14.5 mm., gr. diam. 9.5 mm., less. diam. 4.6 mm. Paratypes measure, males from 13.6 x 8.2 mm. to 15.2 x 9.0 mm.; females from 15.8 x 9.0 mm. to 18.4 x 9.4 mm.

Habitat: Collected by Pilsbry and Welch on the hill east of the Chambas River, the end of the western ridge of the Sierra de Cacarratas about 1 mile east of Florencia, Camaguey, July 11, 1928. Living on limestone cliffs in fairly large colonies, so that about a half a dozen were found to the square meter.

ABNORMAL LORICATES: THE EARLIEST AMERICAN RECORD

BY TOM IREDALE
Australian Museum, Sydney, Australia

When the immortal volume on these mollusks was prepared by Pilsbry there was little on record regarding abnormalities in the group. Such have been commonly found in Australian and Neozelanic waters through the continuous research and the plenitude of the mollusks.

Referring to the Journal of the Royal Geographical Society of London, Vol. IV, published in 1834, I was interested to read the following extract from a paper entitled "Account of the Island and Province of Chiloè. Extracts from the Remark Book kept on board H. M. S. Pylades, by Captain Blanckley, R.N. MS. 1834," p. 356. "Although the coasts of Chiloè abound in shellfish, I could not procure any shells of value, except a few beautiful chitons, as they have here been found. I made anxious search, in the hope of finding one with nine scales or divisions, but I did not succeed, although I employed several natives in the search, and offered a reward of twenty dollars to whoever would bring me one. I however got one of seven divisions, which is also rare. When the Beagle was here, an officer on board procured one of nine. Eight is the most common number."

Hull and I in our "Monograph of Australian Loricates" gave a long account (pp. 135-138) of the number of abnormal specimens secured in Australia, and therein was included the record of three specimens having nine valves, which we regarded as the only record, but the present instance takes us back nearly one hundred years. It is of special interest to us as we concluded that such abnormalities would be found on the west coast of South America, where, apparently, Loricates are as abundant as in Australian waters.

A NEW CALIFORNIAN PSEUDOCHAMA

BY A. M. STRONG

PSEUDOCHAMA GRANTI, new species. Pl. 8, figs. 6, 7.

Upper valve nearly circular, flattened, the umbone spiraling counter clock-wise; sculptured with quite regular, low, concentric laminae, the spacing between which is about 0.5 mm. at the umbone, gradually increasing to about 1 mm. at the margin; the edges of the laminae very finely pleated, the plaits rising here and there to short spines, usually more numerous toward the margin and left side of the shell; under valve cup-shaped, the attachment being from a narrow area to half the area of the valve, sculptured with concentric laminae bearing grooved or folded spines which are much more prominent than those on the upper valve and spaced from 2 to 5 mm. apart in each direction, except near the umbo where they are smaller and more crowded; left side of the shell and spines pure white, right side tinted with rose, both inside and out; margin of valves smooth; hinge plate narrow, the edges of the processes finely serrated; muscle scars elongated. The diameter of the type is 20 mm.

Holotype: No. 5808; paratype No. 5808*a*, Mus. Calif. Acad. Sci., dredged in 20 fms. off the south side of Catalina Island, California. This species is quite common at Catalina Island, in from 15 to 30 fms. attached to living and dead shells, pebbles and other objects brought up by the dredge. Due to its sinistral growth it has been called a deep water variety of the shore form, *Pseudochama exogyra* Conrad, but it differs from that species in the well developed spines of the cup-shaped under valve, smaller size, and distinct color pattern. The species is named in honor of Dr. U. S. Grant of the faculty of the Geological Department of the University of California at Los Angeles, where additional paratypes have been deposited. Topotypes are in the Lowe collection and in that of the Acad. Nat. Sci. Phila., No. 162131.

THE LAND MOLLUSKS OF MACKINAC ISLAND, MICHIGAN

BY A. F. ARCHER

Mackinac Island is a small island about three miles long and two miles wide located in Mackinac Straits. The southern half is hilly, and on the southeastern corner the hills form steep bluffs above a narrow shore line. The predominating surface rock consists of a pale blue limestone. On the whole the geological conditions are very favorable for mollusks. The southern half of the island is fairly well wooded. The woods are now protected, having been made into a state park. The dominant forest tree is the arborvitae (*Thuja occidentalis*). In a few spots hardwoods, especially oaks, form a distinct association. In the latter areas certain mollusks are common, while in coniferous tracts they are scare. Many species are common on open grassy slopes where there is no forest cover. These open areas have been created since human occupation served to remove the arborvitae forest that once covered them. Apparently the removal of the conifers has been favorable to the increased abundance of some species. It is well known that snails do not thrive in North American coniferous forests.

The following list is based mainly on a collection made by myself on July 30, 1933. I am indebted to Mr. Calvin Goodrich for supplementing my results with additional information from a former collecting trip which he took to the same locality. The molluscan fauna of this area is mainly boreal, but there are southern species invading the region, although such elements are not yet numerous.

Euconulus chersinus polygyratus (Pilsbry). Rather common in hardwood tracts in the interior of the island.

Retinella electrina (Gould).

Retinella indentata (Say).

Paravitrea multidentata (Binney). Found by Goodrich on the guard rails of steps descending from the bluff at Arch Rock on the east side of the island.

Zonitoides arboreus (Say). Common in the limestone talus near Fort Mackinac.

Agriolimax campestris (Say). Under logs and leaves in the hardwoods.

Limax maximus L. Under oak leaves in the cemetery.

Helicodiscus parallelus (Say). This species occurs both in the hardwoods under leaves and in the limestone talus near the fort.

Columella edentula (Draparnaud). In limestone talus.

Gonyodiscus cronkhitei catskillensis (Pilsbry). In limestone talus and in the hardwoods.

Anguispira alternata (Say). This species occurs in all habitats, but is especially common in open fields around burdocks, or at the bases of bluffs where there is little forest cover. However, it is one of the few species noticeable in the arborvitae. Near the fort it was found in a nasturtium garden. It is very variable in color. A surprisingly large number of pure albinoes are found in this colony. Many pale reddish and very many rufous ones occur. The typically brown colored ones made up only about a third of the total collection. Several rather high spired individuals were also found.

Polygyra albolabris (Say). Rather common in the hardwoods judging from the number of dead ones lying around which had been gnawed by rodents. The local race is very large.

Polygyra fraterna (Say). A few were found at the base of the bluffs among herbs. They were all unusually large.

Cochlicopa lubrica (Müller). Very abundant in the limestone talus.

Strobilops labyrinthica virgo (Pilsbry). Common both in the limestone talus and in the hardwoods under leaves.

Vertigo ventricosa (Morse). Common in the limestone talus.

Pupilla muscorum (Linnaeus). A few in the limestone talus. Goodrich found it abundant on the sides of a well.

Vallonia costata (Müller). Common in the limestone talus.

Philomycus carolinianus (Bosc). Under leaves and logs in the hardwoods. Only immature specimens were found.

Succinea ovalis Say. Found below the bluffs near the East End Cottages. They were large, elongated, and of a pinkish hue.

TWO NEW RACES AND A NEW SPECIES OF HELISOMA FROM CALIFORNIA

BY FRANK C. BAKER

HELISOMA OCCIDENTALE DEPRESSUM, var. nov.

Shell differing from typical *occidentale* in being of less axial height, the whorls more tightly coiled, three turns visible on the umbilical side, which is less deeply excavated, the body whorl less voluminous. Color greenish horn. Whorls 4½.

Height 9.0 mm., diam, 20.0 mm.; aperture height 8.5 mm., diam. 6.7 mm. Holotype 3239.

Height 10.0 mm., diam. 19.5 mm.; aperture height 9.0 mm., diam. 6.6 mm. Paratype 3240.

Height 9.9 mm., diam. 18.5 mm.; aperture height 9.0 mm., diam. 6.0 mm. Paratype 3240.

Height 12.0 mm., diam. 25.0 mm.; aperture height 11.5 mm., diam. 7.9 mm. *Occidentale.*

Type locality: Lower Klamath Lake, Oregon and California. Collected by Junius Henderson. *Types:* Baker Coll.: Nos. 3239, 3240.

This race is apparently distributed in Oregon and northern California and has been identified as *occidentalis, ammon,* and *binneyi,* from all of which it is quite distinct.

HELISOMA TENUE CALIFORNIENSE, var. nov.

Shell differing from typical *tenue* in its larger size, wider whorls, more depressed and flatter spire whorls, umbilical whorls coiled in same plane, sculpture coarse, the space between the riblets several times the width of the riblets; color usually greenish horn.

Height 10.0 mm., gr. diam. 21.5 mm., less. diam. 17.4 mm.; aperture height 9.0 mm., diam. 6.9 mm. Holotype.

Height 9.6 mm., gr. diam. 18.6 mm., less. diam. 15.3 mm.; aperture height 9.0 mm., diam. 5.4 mm. Paratype.

Height 9.0 mm., gr. diam. 17.6 mm., less. diam. 14.0 mm.; aperture height 8.0 mm., diam. 5.3 mm. Paratype.

Type locality: Ponds in bed of Guadalupe Creek, San Jose, Santa Clara Co., California. Collected by Mr. Clark Hubbs. *Holotype:* Leland Stanford University, No. 5853. *Paratypes:* Collection F. C. Baker, No. 3262.

This large Helisoma has been identified as *occidentalis, tenuis* and *trivolvis.* It somewhat resembles *H. o. depressum,* differing in its less deeply excavated umbilical region, more rapidly enlarging body whorl and decidedly ear-shaped aperture, that of *depressum* being rounded or moon-shaped. This race is widely distributed in California from Santa Clara County southward. *Helisoma tenue* is widely distributed in California and does not differ materially from the species as found in Mexico and Arizona.

HELISOMA HEMPHILLI F. C. Baker and J. Henderson.

Shell with four rapidly enlarging whorls, the body whorl disproportionately enlarged near the aperture; spire whorls flat the body whorl slightly raised above the general level and with a sharp, somewhat pinched carina extending to the aperture; base showing a trifle more than two full whorls, the umbilicus narrow and deep, the last whorl with a distinct carina; sculpture coarse, the riblets cord-like and widely spaced; aperture distinctly auriform, much narrowed and V-shaped above, wide and but slightly concave below; there is a slight callus on the parietal wall; color yellowish to dark horn, often shining or polished.

Height 9.5 mm., diam. 16.5 mm.; aperture height 9.0 mm., diam. 6.2 mm. Holotype.

Height 8.3 mm., diam. 14.0 mm.; aperture height 8.0 mm., diam. 5.0 mm. Paratype.

Height 7.6 mm., diam. 6.8 mm.; aperture height 6.8 mm., diam. 5.6 mm. Paratype.

Type locality: Mountain Lake, San Francisco, Calif. Collected by H. Hemphill. *Types and paratypes:* Leland Stanford University. *Paratypes:* Coll. F. C. Baker, No. 3288.

This Helisoma is distinguished by its strongly carinated body whorl, strong rib-costate sculpture and distinctly auriform aperture. Its greater axial height, strong carinae on body whorl, marked sculpture, and form of aperture dis-

tinguish it from any form of *tenue*. *Binneyi* is larger with much heavier sculpture, *ammon* is also larger with comparatively finer sculpture, more whorls, and deeper and wider umbilical region. The new species has been seen only from Mountain Lake where it appears to have been abundant.

A NEW SUBSPECIES OF OLIVA RETICULARIS FROM SOUTHERN FLORIDA

BY WILLIAM J. CLENCH

OLIVA RETICULARIS BOLLINGI, subsp. nov. Pl. 7, figs. 3, 4.

Description: Shell solid, heavy, polished, and widest at a little above the mid-region. Ground color white to pale ivory, covered with innumerable tent-like, reddish-brown checks, their apices directed both away and towards the aperture in the conventional apertural view. These checks are more or less organized in an axial arrangement. This secondary reddish-brown coloration is not always finely drawn on the checks themselves, but dispersed sufficiently between the checks to render a slight reddish-brown cast to the shells. The single paratype has the mid-region of the body whorl somewhat cleared of these checks, forming a band. Along and below the suture the pattern changes to small blocks of thread-like lines arranged axially. These are to be noted on all but the nuclear whorls. Whorls seven, compact, and broadly convex. Spire somewhat produced and conic. Palatal lip rather thick. Parietal walls calloused and supporting a series of small plications throughout its length. Aperture long and narrow. Sculpture of smooth growth ridges, visible only in high-lighted areas. Suture slightly indented. Holotype, length 61.5 mm., width 28 mm.; paratype, length 56.2 mm., width 24.1 mm.

Holotype: M. C. Z. 76656, found in crab-traps off Miami, Florida, in about 200 feet of water. Paratype, M. C. Z. 76657, same data.

Remarks: This new subspecies differs quite noticeably from the typical form. It is a much larger and proportionately heavier shell, the color markings are stronger, and the ground color is not as white or creamy. It is named for Mr.

R. C. Bolling, one of my two companions on a recent Florida expedition.

This new variety superficially resembles *O. nivosa* Marrat (*in* Sowerby, Thesaurus Conchyliorum, 4, Oliva, p. 22, pl. 17, fig. 276) but differs from that species in having a much wider aperture at the base, not possessing a tubercle on the upper parietal area of the aperture and having a more conic spire.

WILLIAM ELLIOTT BURNETT, 1872-1933

BY STANLEY T. BROOKS

William Eliott Burnett, a collector of note and an ardent student of conchology for more than thirty years, died at his home in Bradford, Pennsylvania, on August 20, 1933. Mr. Burnett was born at Garland, a small town in Warren County, on May 22, 1872. He had inherited a deep love of natural history from his father, David Alexander Burnett, a collector; and his whole life, during his leisure hours, was dedicated to the building up of large series of natural objects.

In 1896, he married Miss Mamie Belle Arrowsmith, who became his devoted companion until her death thirteen years later. His wife's death and the complete loss of his hearing when he was forty, caused him to devote himself more and more to the study of mollusks. He spent several winters at Beaufort, North Carolina, making friends among the fishermen and augmenting his collection from the shells hauled in with their nets.

Early in 1933 his eye-sight began to fail and this loss, along with his deafness, tended to make him lose interest and hastened his end. Death resulted very suddenly from post-operative shock following a serious leg injury.

The large collection of nearly five thousand sets of land, freshwater, and marine shells, which formed his life contribution to science, resides in the Laboratory of Recent

Invertebrates at the Carnegie Museum. The Museum was also enriched by his large collection of Amerind artifacts and minerals. The American Malacological Union has lost an apt and careful student by his passing.

PUBLICATIONS RECEIVED

A Study of Polygyra inflecta (Say). By Allan F. Archer. (Occas. Pap. Mus. Zool. Univ. Mich. No. 276, 1933.) The characters, variation, distribution, systematic position and habits of this snail are considered, and a key to related Triodopses is given. It is found especially in open oak woods. *P. approximans* Clapp and *P. edentata* Samps. are ranked as varieties, but the author does not state that he has seen intergrading specimens, connecting them with *P. inflecta*.—H. A. P.

An Index to the International Rules of Zoological Nomenclature. By Harley J. Van Cleave. (Trans. Amer. Microscop. Soc., vol. 52, pp. 322-5.) A time-saving guide to the provisions of the Code. In lots of 5 or more they may be obtained for $0.06 per copy.

A Check List of Nearctic Zonitidae. By H. Burrington Baker. (Occas. Pap. Mus. Zool. Univ. Mich. No. 269.) A revision of the classification of our Zonitidae has been urgently needed for a long time. Some years ago Dr. Baker undertook the task of collecting and dissecting them, and in several papers the anatomy of most of the small and ambiguous forms was figured and their relationships and nomenclature discussed with admirable clarity and completeness. In the present paper his taxonomic results are expressed in the brief form of a list of the species known from America north of Mexico. Fifteen genera, 101 species and 35 subspecies are recognized. The synonyms and in most cases the type localities are given. The new name *Mesomphix perlaevis vulgatus* is proposed for *M. laevigatus* (*Helix laevigata* Fér., not of Linnaeus).—H. A. P.

MARINE MOLLUSCA FROM ACAPULCO, MEXICO, with notes on other species. By A. M. Strong, G. D. Hanna and L. G. Hertlein. (Proc. Cal. Acad. Sci., Vol. 21, 1933, pp. 117-130.) Over 100 species dredged by the Templeton Crocker Expedition of 1932 are enumerated, with descriptions of *Mitra zaca, Calliostoma bonita* and *C. rema,* new species. The *Mitra* is 130 mm. long, probably the largest west coast species. It is one of the black miters, section *Atrimitra.* Notes are given on a number of little-known and interesting forms of Cancellaria, Metula, Turritella and Xenophora; the last, *X. robusta* Verrill, is a fine species not before figured.—H. A. P.

TERMINOLOGY OF TYPES. By Donald Leslie Frizzell. (American Midland Naturalist, vol. 14, pp. 637-668, 1933.) The formidable body of terminology which has grown up for the designation of type-specimens and types of genera is reviewed, and the terms which have been proposed, some 233, are defined. The list contains many synonymous and homonymous terms used by different authors, or with different shades of meaning. Out of the lot Dr. Frizzell recommends that general use be restricted to the following 10 terms.

Genotype. The single species upon which a genus is based.

Syntype. Any specimen of an author's original material when no holotype was designated. A cotype.

Holotype. A single specimen (or fragment) upon which a species is based.

Paratype. A specimen other than the holotype upon which an original specific description is based.

Lectotype. A syntype chosen subsequently to the original description to take the place which in other cases a holotype occupies.

Neotype. A later selected type of a species, necessitated by loss of the original type material; must come from the original locality.

Hypotype. A described or figured specimen used in publication in extending or correcting the knowledge of a previously defined species.

Topotype. A specimen from the original locality from which a species was described.

Homoeotype. Specimen compared by a competent observer with the holotype, lectotype or other primary type of a species.

Plastotype. Any artificial specimen moulded directly from a type.

This is a timely essay, for the terminology of "types" has reached fantastic proportions.—H. A. P.

NOTES AND NEWS

THE "MANGAREVA EXPEDITION" has been organized by the B. P. Bishop Museum for conducting studies of ethnology and natural history in the little-known parts of southeastern Polynesia, chiefly at Mangareva, Oeno, Pitcairn, Rapa, Tubuai, Rurutu, Raivavae and Rimitara islands. The chief purpose of the expedition is to record data regarding native races, flora and land fauna, which are disappearing at a rapid rate. The scientific staff includes ethnologists, botanists, Dr. C. Montague Cooke, Jr. and Donald Anderson, malacologists. Dr. C. Montague Cooke, Jr., has been appointed leader of the expedition, which is to sail about April first.

MANGELIA ALBIVESTIS, new name for *Mangilia pura* Pils., Proc. A. N. S. Phila., 1904, p. 9, not *Mangelia pura* Gould, Proc. Bost. Soc. N. H., vol. 7, p. 339, 1860. Mr. E. R. Sykes has kindly called my attention to this duplication of names. —H. A. PILSBRY.

THE SUBGENUS EUDENTALIUM.—Messrs. Cotton and Godfrey have proposed this group (The South Australian Naturalist, vol. 14, p. 140, 1933) for the Australian species *Dentalium quadricostatum* Brazier. This species has not been clearly described and so far as I know has not been figured. The above authors repeat the original account, and apparently had not seen the shell. It does not seem helpful to establish new groups on such imperfectly known forms. It seems to differ from subg. *Tesseracme* Pils., 1898, by having the four primary ribs serrate.—PILSBRY.

CHERSINA Beck, 1837 (Index Moll., p. 74) may take the type *C. virginea* (L.), and is thus an exact synonym of *Liguus* Montf. *Oxystrombus* Moerch, 1865 (Jour. de Conchyl., p. 170) of which the monotype is *O. fasciatus* (Müller), is exactly equivalent to *Orthalicinus* Fischer and Crosse, 1875.—PILSBRY.

MOLLUSKS FROM CHATTANOOGA, TENNESSEE.—While accompanying Professor E. T. Wherry, of the University of Pennsylvania, on a botanical trip through Tennessee in June, 1933, I collected mollusks at a number of localities, the most interesting being a limestone outcrop at a "Disappearing Falls" about five hundred yards from the left bank of the Tennessee River, about ten miles west of Chattanooga, Tennessee. The following were found: *Polygyra spinosa* (Lea), *P. albolabris* (Say), *P. zaleta* (Binney), *P. appressa perigrapta* Pils., *P. tridentata* (Say), *P. stenotrema* (Fér.), *Zonitoides arboreus* (Say), *Ventridens gularis* Say, *Mesomphix perlaevis vulgatus* H. B. Baker, *Discus patula* (Desh.), *Anguispira alternata crassa* "Clapp" Walker, *Hawaiia minuscula* (Binney), *Helicina orbiculata* (Say), *Campeloma subsolidum* (Anth.), *Anodonta imbecilis* Say, *Lampsilis parva* (Barnes), *Proptera alata* (Say).—HORACE G. RICHARDS, Princeton University.

ARBOREAL BEHAVIOR OF *Helicina orbiculata tropica* "Jan" Pfr.—*H. o. tropica* is one of the most abundant species of terrestrial gastropods occurring in Dallas County, Texas. After a light shower one can collect hundreds of individuals that are creeping over weeds and grasses in many pasture lands. Since it is a snail that is especially hardy and has a great resistance to drouth, individuals appear to be as abundant in exposed areas as in protected woodland regions. The writer has frequently observed a tendency of this species to ascend trees. Ordinarily the animal does not get more than five or six feet above the ground. However, a recent field trip to a sparsely wooded region six miles southwest of Dallas, revealed a "tree-climbing" colony of *H. orbiculata*. Hundreds of snails were found attached to the bark of hackberry (*Celtis occidentalis*) and cedar elm

(*Ulmus crassifolia*) trees. Some had only begun their ascent of the trees, whereas others had attained a height of approximately 12 to 14 feet above the ground. On one medium sized cedar elm on which the snails were especially abundant a census was made of the population. Thirty-eight snails were counted and the animals were rather evenly distributed from the base of the trunk to a distance of approximately fourteen feet above the ground. Most of the snails were found on the northern exposure of the trunk. Their occurrence on that particular side of the tree cannot be accounted for unless they were there for protection or for food in the form of *Pleurococcus* which was plentiful on this particular tree. However, the food and protection factors hardy seem tenable in accounting for their position, since, on several other trees in the same vicinity, snails were observed to be scattered at random all around the trunk, regardless of direction of exposure and food. Most of the snails were inactive and had their opercula drawn approximately 2 mm. within the aperture openings. A shower of rain would undoubtedly result in the activity of these snails, judging from the behavior of the same species on the ground. Mr. John Litsey of Dallas informed the writer that he had seen this species in trees twenty feet above the ground.—ELMER P. CHEATUM, Dallas, Texas.

SINISTRAL LAND SNAILS FROM ANN ARBOR, MICHIGAN.—Since February, 1932, I have found four reversed specimens of normally dextral species of terrestrial mollusks in the township in which Ann Arbor is located. They are: *Polygyra monodon* (Rack.). The shell was found on a small island in the Huron River near Argo Dam, Ann Arbor. So far as I can learn, this the first record of a sinistral specimen of this species. *Polygyra thyroidus* (Say). One medium-sized sinistral individual found April 29, 1933, during a collecting trip to a small valley one mile west of Geddes. The shell was lying on a pile of dead grass. Like many examples of *P. thyroidus* of this region, it has only the faintest trace of a parietal tooth. About a month later a second sinistral specimen of this species was found on a

hilltop at Glen Ridge near Cascade Glen, west of Ann Arbor. *Anguispira alternata* (Say). Taken near the top of a high hillside occupied by a colony of *alternata,* amid some cultivated shrubs. The locality is Cedar Bend Park (known also as Island Park). The Museum of Zoology of the University of Michigan has a reversed specimen of *Ventridens demissus* (Say) which was taken by Mr. Henry Vander Schalie near Duncanville, Tuscaloosa Co., Alabama, in the summer of 1932.—ALLAN F. ARCHER.

LYOGYRUS VANHYNINGI, new species, pl. 13, fig. 9.—The shell is small, almost imperforate, ovate-conic, smooth except for microscopic lines of growth; greenish-gray when the ferrous coating has been removed. Apex obtuse; spire conic; suture impressed; whorls 4, slowly increasing, convex, the body-whorl large, periphery evenly convex. Aperture large, oval, broad below; lip thin, evenly curved, the adnate parietal callus rather thick. Operculum multispiral with central nucleus. Height 2.4 mm., diam. 1.8 mm.; aperture 1.5 x 1.1 mm. Seminole Springs, 15 miles east of Eustis, Lake Co., Florida. Type and paratypes 162084 A.N.S.P., collected by O. C. Van Hyning, received from T. Van Hyning. This shell differs from *L. dalli* P. & B. by being narrower and almost imperforate. It is more broadly conic than *L. granum* (Say) and *L. pupoides* (Gld.).—E. G. VANATTA.

PROFESSOR JUNIUS HENDERSON lectured on "The Esthetic and Economic Relations of Mollusks" at the California Academy of Sciences, Jan. 3rd.

MR. CHARLES A. BLAKE has been made Associate Curator of Mollusks at the Boston Society of Natural History.—*Museum News.*

DERMESTID BEETLES A NUISANCE TO CONCHOLOGIC COLLECTIONS.—Much has been said about the dermestid beetle *Anthrenus museorum* as a destructive insect in museums, especially of damage done to skins and insect collections. Practically nothing has been mentioned concerning this insect as constituting a nuisance, and perhaps a menace, to conchological collections.

In preparing univalve shells for preservation, some of the soft parts may remain in the shell, particularly in the first one or two whorls. It is this part of the animal that soon dries up and becomes food for the larva of this beetle. Much of the food of these larvae is not taken into the digestive system but falls from the mouth in very minute particles. These, plus the excreta, accumulate in the shell, and finally collect at the bottom of the tray, covering the labels and other specimens with a layer of "dermestid dust." The moulted larval skins are strewn around in small clusters. But this only constitutes a minor problem to the conchologist.

It has been a common practice of some conchologists to place minute shells in gelatine capsules. The dermestid larvae gnaw their way through and into them. From the holes many of the shells fall into the trays, and if more than one species is present, the disturbed shells may be of little scientific value. This has been especially true in older collections where capsules were freely used. To overcome this danger the gelatine capsules must be replaced by glass vials. If the larvae should work their way through the cotton or cork stoppers, there is no danger of the shells falling out of the vials.

In order to avoid such happenings it is best to control this insect by some means. The W. J. Clench method is to drop the live snails into a 2% aqueous solution of corrosive sublimate. The soft parts of the snail, upon drying, are impregnated with a small amount which protects against the dermestes. The smaller shells are allowed from 12-24 hours in the preserving fluid, and the larger ones from 36-48 hours.

If the collection has already become heavily infested, it may be controlled by fumigating with hydrocyanic acid gas or with carbon bisulfide. The trays containing the shells and dermestids can be placed in an air-tight container into which calcium cyanide is sprinkled on the bottom of the container at the rate of ¾ of a pound per 1,000 cubic feet. If carbon bisulfide is used it should be poured into a con-

tainer of some sort, which is fastened at the top of the fumigating box. This fumigant is used at the rate of 1 pound per 100 cubic fet. Paradichlorobenzene, although rather expensive, is recommended at the rate of 1 pound to each 10 cubic feet. Naphthalene, used at the same rate, is also effective in killing these beetles.[1]—GORDON MACMILLAN KUTCHKA, Carnegie Museum, Pittsburgh, Pa.

THE ANIMAL OF PROSERPINA.—When fully expanded, the mantle flaps in the Jamaican species completely cover the shell; the right one extends over the apex and almost down to the periphery while the left one extends over the umbilicus to meet the other. In *P. nitida* Swby., *P. linguifera* Pfr. and *P. bidentata* C. B. A. they are yellowish green with black maculations, but in *P. pisum* C. B. A. are bright green. The foot, which is similarly colored, is very long, slender and carinate; progression is relatively rapid and is mainly accomplished by lateral, snake-like undulations, although some vague movement appears to take place in the very narrow middle zone of the sole. The animals are very active; when disturbed, they quickly draw in the mantle-flaps and lash their tails back and forth with remarkable strength for small snails.—H. BURRINGTON BAKER.

PALUDINA HUMEROSA Anthony.—The single type specimen of this species (M. C. Z. 72332) shows it to be a nearly smooth form of *Lithasia verrucosa* Raf. It was placed in *Leptoxis* [*Anculosa*] by Binney (Smithsonian Misc. Colln., No. 144, pt. 3, p. 64, 1865). In many large series of *L. verrucosa*, especially from localities along the Tennessee River, smooth forms will be found associated with the more abundant papillose specimens.—W. J. CLENCH.

[1] Metcalf, C. L., and Flint, W. P. Destructive and Useful Insects, 1928, pp. 746-48. Whitmarsh, R. D. Ohio Agricultural Experiment Station, Bulletin, No. 253, 1912, pp. 118-19. Clench, W. J. The Nautilus, Vol. 43, pp. 33-34.

THE AMERICAN MALACOLOGICAL UNION

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THE NAUTILUS

A QUARTERLY
DEVOTED TO THE INTERESTS
OF CONCHOLOGISTS

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H. BURRINGTON BAKER, Associate Professor of Zoology, University of Pennsylvania.

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